U.S. TURNKEY SYSTEMS MARKETS

1969 - 1984

INPUT

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INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services (software, processing services, turnkey systems, systems integration, professional services, communications, systems/software maintenance and support).

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Market Analysis Program (MAP)

U.S. Turnkey Systems Markets, 1989-1994

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Abstract

This annual report provides insight, analysis, and expenditures forecasts for the U.S. turnkey systems. Market size and growth rates are provided for 15 industry-specific market segments as well as for seven cross-industry turnkey systems market segments.

The issues, trends, and events driving the market are presented and analyzed. The report reflects an analysis of INPUT's survey of turnkey systems value-added resellers (VARs) and interviews of turnkey systems suppliers. Business and market strategy suggestions are provided.

The report contains 245 pages and 37 exhibits. It is part of a seven-volume series describing the information services market and its mode of delivery. The six other volumes are:

- *U.S. Processing Services Markets, 1989-1994*
- *U.S. Professional Services Markets, 1989-1994*
- *U.S. Network Services Markets, 1989-1994*
- *U.S. Software Products*
- *Systems Operations—Growth for the 1990s*
- *U.S. Systems Integration Markets, 1989-1994*

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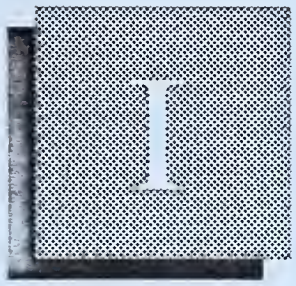
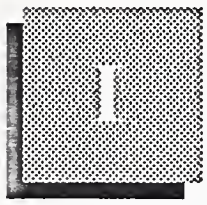


Introduction



Introduction

This report is produced as part of INPUT's Market Analysis and Planning Service program for the information services industry. It is one of five annual reports on the delivery modes that make up the information services industry. The other delivery modes are software products, network services, processing services, professional services, and systems integration.

The turnkey systems delivery mode covers the value-added market channel as well as turnkey systems product delivery of large computer systems, independent software, and professional services companies. A turnkey systems product includes a bundling of hardware and software in a total-solutions product sale. A reseller provides a turnkey systems solution by taking title to hardware and/or software of a supplier/vendor, adding product and/or service value, and combining everything into a total-solutions package.

A

Purpose of the Report

The report investigates the turnkey systems mode of delivery for the information services market.

Turnkey systems companies and their suppliers will benefit from this report in the following ways:

- By identifying possible new markets and product opportunities to complement existing strategies
- By assessing the risk and investment risk/exposure
- By keeping informed on the issues, trends, and developments shaping the turnkey systems markets

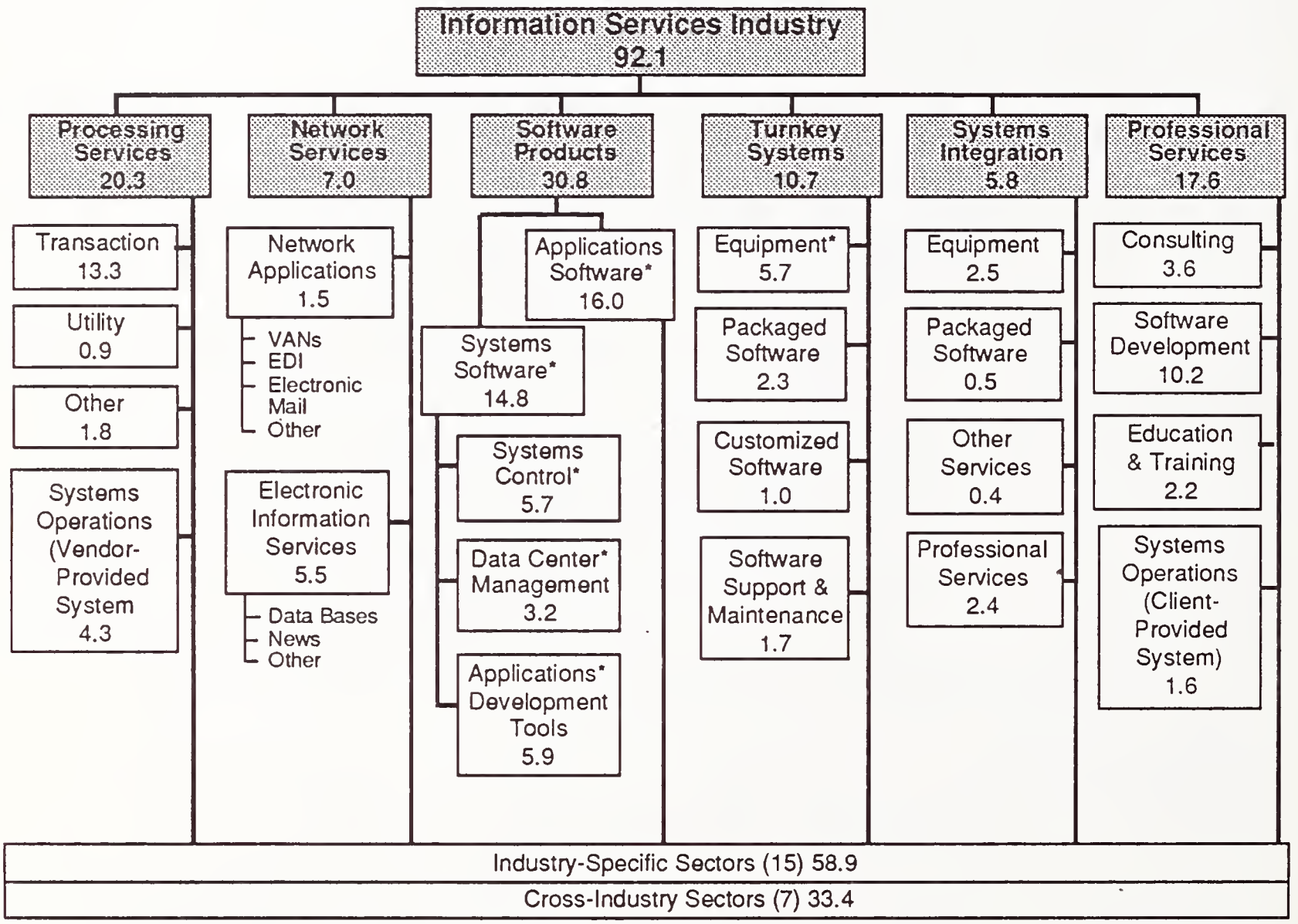
B

Information Services Industry Structure

Exhibit I-1 defines the scope of the information services industry that is tracked and analyzed by INPUT. Annual market reports are written for each of the delivery modes shown and detailed discussions of all sub-modes are included.

EXHIBIT I-1

Structure of the U.S. Information Services Market ($ Billions)



*Broken out by Workstation/PC, Minicomputer, and Mainframe segments

Source: INPUT

C

Turnkey Systems Definition

Included in the report as participants in the turnkey systems market are the numerous value-added resellers (VARs) that provide hardware/software systems total solutions to the end user. The terms *turnkey systems supplier* and *value-added reseller* have come to overlap in recent years. Therefore, this year's annual report on the turnkey systems delivery mode will link the two terms. If a distinction still remains between the two, INPUT believes it is more in terms of the larger size of the

traditional turnkey systems companies, their greater degree of hardware modification, and the private labeling they sometimes perform. VARs, on the other hand, tend to perform more software customization. Both, however, emphasize value-added solutions for industry-specific or cross-industry markets.

The turnkey systems company designation is associated more with larger companies—such as Daisy Systems, ASK Computer Systems, Triad, Computervision, and Intergraph—that originally focused on providing bundled hardware/software solutions as well as an emphasis on maintenance services. Historically, many of these companies provided a proprietary or customized hardware product component but today may use standard platforms from computer systems manufacturers. Many of the traditional turnkey systems companies are now unbundling their hardware, software, and services offerings, and providing more emphasis on software and services.

In particular, many turnkey systems vendors are significantly expanding services such as consulting, hardware, and software maintenance; software customization; and systems integration. Similarly, many smaller turnkey systems companies have also altered product strategy to provide more of a services emphasis.

Both types of vendors now emphasize industry-specific and cross-industry (horizontal) software offerings, either developed internally or provided by other turnkey systems companies, software companies, or third-party applications developers.

Another shift in the market is provided by entry of the computer systems vendors, some professional services companies, and other types of non-traditional resellers, many of which are beginning to stress total-solution, industry-specific marketing. The applications software portion of these companies' offerings is often based on an OEM arrangement, or can be part of a joint marketing arrangement with an independent software developer that may also be a VAR. However, many companies also developed at least part of the applications software solution internally.

INPUT currently defines the turnkey systems market as consisting of five main layers of products and services that go into a turnkey system:

- Equipment
  - Standard and/or custom
  - Plus maintenance and support

- Systems software
  - Standard software
  - Plus maintenance and support

- Applications software
  - Standard software
  - Plus maintenance and support

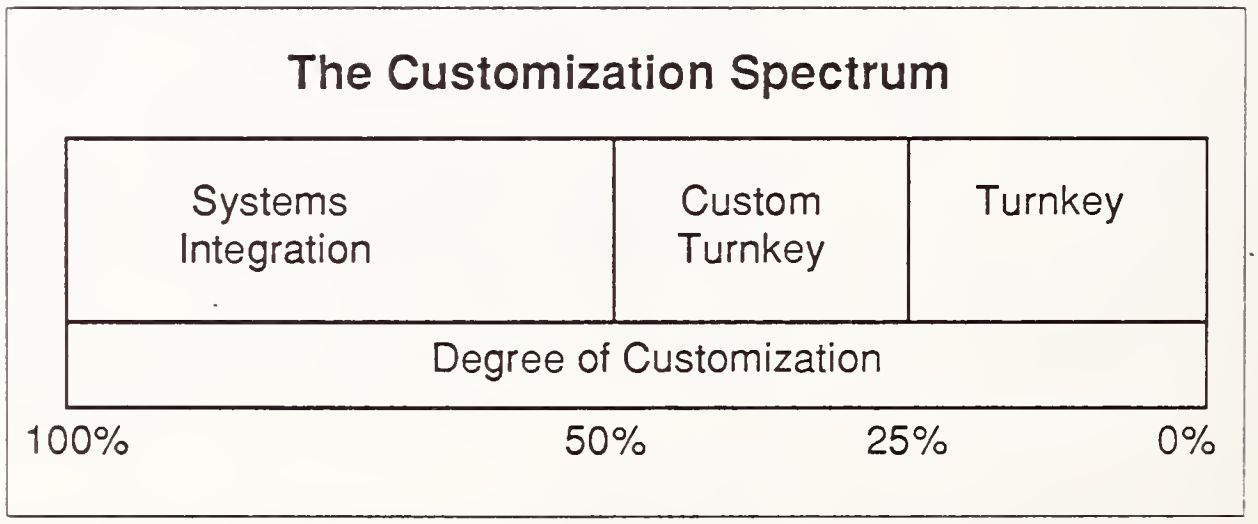
- Professional services
  - Customization of the applications software, if required
  - Education and training, consultancy, etc.—if required

- Support
  - Documentation
  - Financing, if required
  - Installation

In the turnkey systems market, these products and services are packaged and sold by a single vendor. The same vendor may also undertake to maintain and support the total system.

In addition, a customization spectrum of product offerings in the value-added reseller market should also include systems integration. As mentioned, many turnkey systems VAR vendors are expanding into systems integration services, and in turn more systems integrators are providing turnkey solutions, but as part of a multivendor hardware/software solution. Exhibit I-2 shows INPUT's customization spectrum model for distinguishing between turnkey systems suppliers, VARs, and systems integrators. Many of the mid- to large-sized turnkey systems VARs provide a standard applications software product. However, particularly in vertical markets such as process manufacturing, there is a trend to providing customized alternatives for particular industry subsegments, such as pharmaceutical manufacturers.

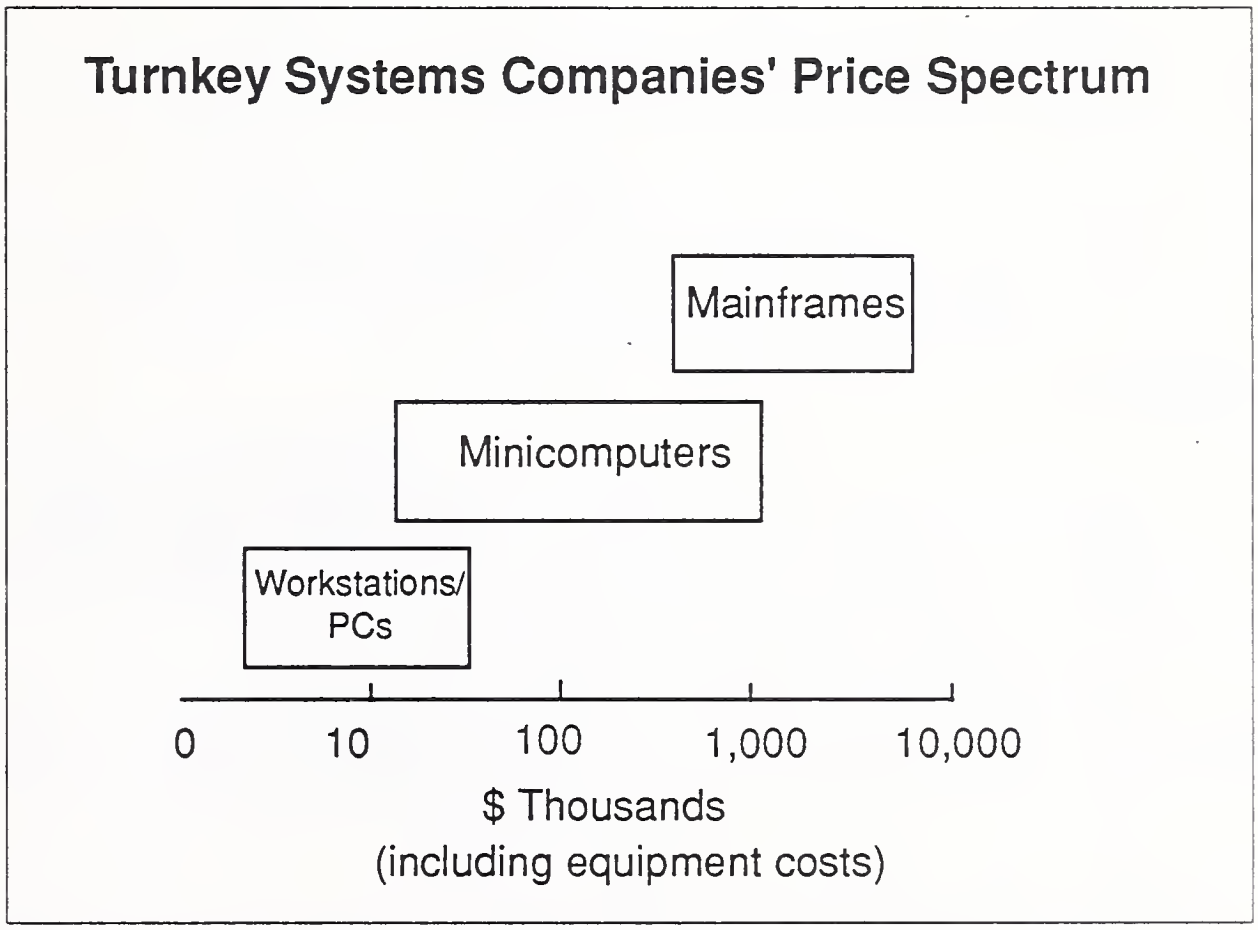
EXHIBIT I-2



It is possible for turnkey systems to be made of standard applications packages plus a high degree of customization. In these cases, it may be difficult to determine the category in which the solutions fall. In principle, INPUT uses the criterion that if the value of the standard applications software is greater than the value of customization and other professional services, then the solution is a custom turnkey system; if not, the solution is systems integration.

Turnkey systems are sold on the full range of equipment. The degree of customization and the price of the complete system increase with the power of the equipment platform. Exhibit I-3 shows that turnkey systems on personal computers (PCs) start at about $5,000 and go up to $50,000, including equipment. Systems on minicomputers start at about $20,000 and can go up to $1 million. Mainframe systems usually start at about $500,000 and can go well above $1 million.

EXHIBIT I-3



Most turnkey systems are sold on PCs and minicomputers.

INPUT does not include systems integrators in the turnkey systems general marketing channel. Although the end product from both sources is oftentimes a turnkey solution, there are fundamental differences in terms of the scope/complexity, length, and cost of their respective solutions.

For similarities between systems integrators and turnkey systems suppliers, see Exhibit I-4.

Differences between systems integrators and turnkey systems vendors are included in Exhibit I-5.

EXHIBIT I-4

Similarities between Systems Integrators and Turnkey Systems Suppliers

- Prime contractor's role
- Multiple vendors involved
- Equipment Delivery
- Installation, training, and support

EXHIBIT I-5

Differences between Systems Integrators and Turnkey Systems Vendors

Systems Integration	Turnkey Systems
Strategic design and consulting	Tactical consulting
Unique	Replicable
Often large	Often small
High-level complexity	Modest complexity
High level of centralization	Low level of centralization

1. Vendor Types

There are two principal types of vendors selling turnkey systems:

- Computer manufacturers
- Independent vendors

Computer manufacturers follow a number of options in developing turnkey systems. They might develop their own specific applications software in-house; they might license applications from an independent software vendor to sell themselves, together with their equipment; or they might purchase applications software products or independent software vendors to maximize software revenue capture in particular vertical markets.

Turnkey systems value-added resellers that privately label equipment from systems vendors are defined by INPUT as providing an OEM-based turnkey product. Some manufacturer vendors (to VARs) of equipment also sell their equipment bundled with their own systems and applications software that they have either internally developed or licensed from an independent software company. These solutions tend to have a higher component of hardware relative to software and professional services than do value-added turnkey solutions from independent software developers.

Independent software developers that are also value-added resellers (VARs) usually have developed the applications software in-house, although increasingly they are also licensing or cross-licensing applications from other independents to market and sell themselves. To sell a complete turnkey system, the software developers usually take title to the equipment from the equipment vendor and then deliver, install, and provide software support. Most of the hardware maintenance is provided by the computer manufacturer or a third-party maintenance provider.

For minicomputer systems, these independent software VARs will generally have formal agreements with one or more equipment vendors from which they can take title to the equipment.

Certain equipment vendors, such as IBM, prefer the use of terminology other than *VAR* to refer to reselling arrangements. Alternate designations include *business partners, industry remarketers,* and *agents*. However, many of these types of arrangements, which often involve joint-selling arrangements, are not considered part of the turnkey systems market.

Such sales are recorded by INPUT into their various components, such as software products and professional services, rather than classified in the turnkey systems market, even though such sales involve solutions selling where there is a substantial value-added component to the sale. The major distinction with the VAR market is that these software developers do not take title to the hardware equipment. See Exhibits I-6 and I-7.

EXHIBIT I-6

Turnkey Systems Marketing Models

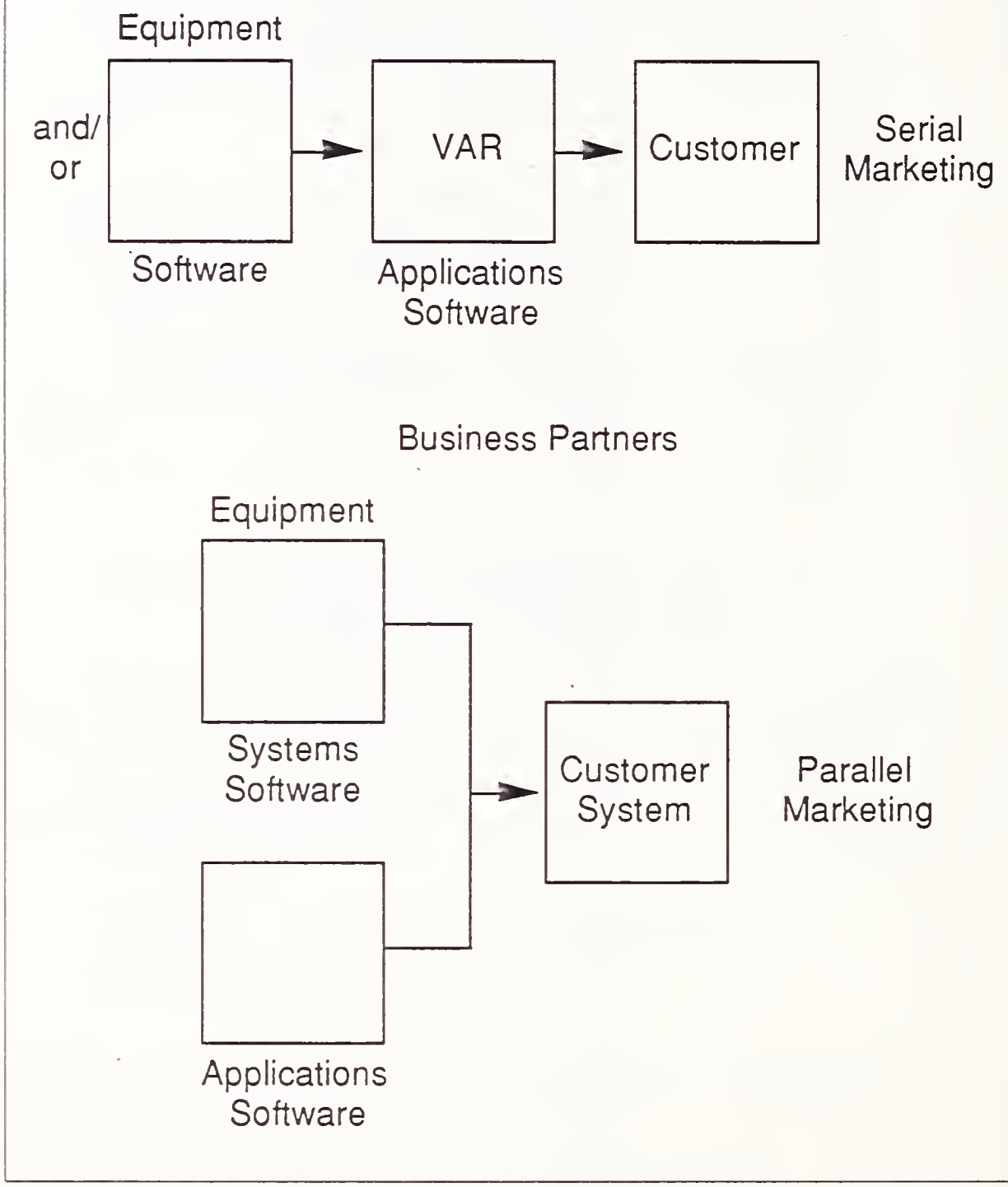
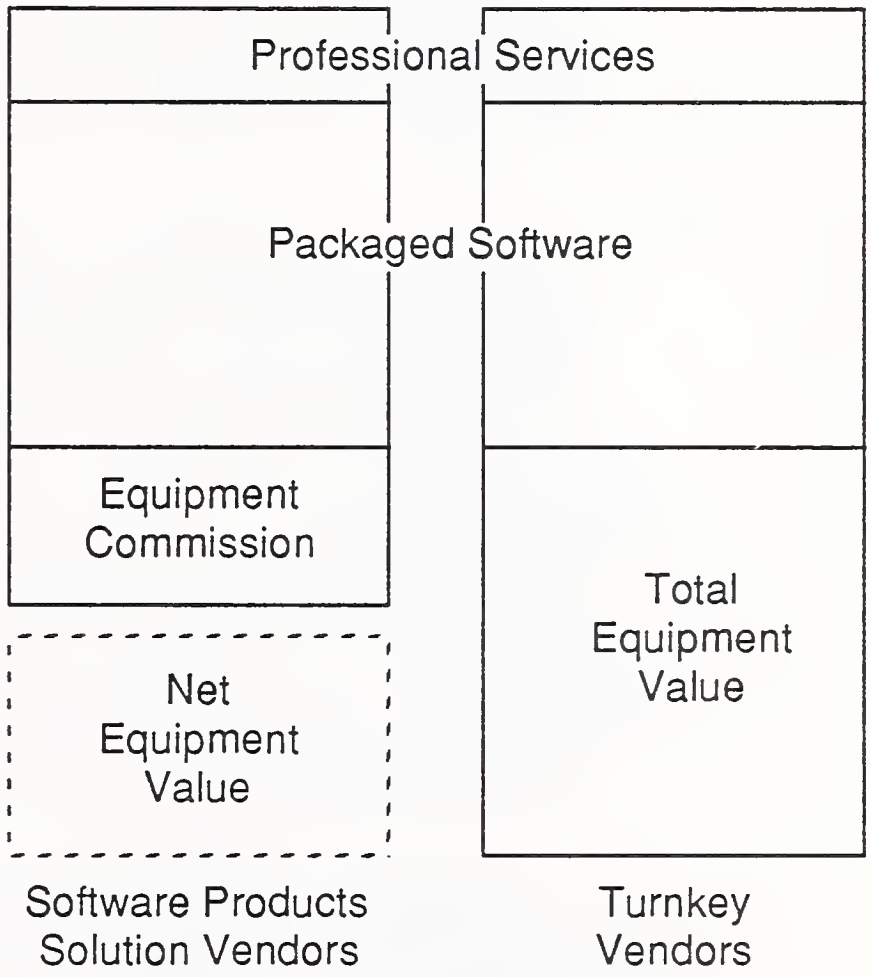


EXHIBIT I-7

Revenue Breakdown for Different Types of Packaged Total-Solutions Vendors



For PC systems, the independent software VAR may have an agreement with a distributor of the equipment rather than with the equipment vendor.

Most of the independent VARs will limit themselves to a small range of equipment; otherwise they overextend their support capabilities. Equally, it is in the interest of the equipment and/or software vendors to limit the better VARs to just the vendor's own system and/or software. This is done through formal agreements.

Within the past few years, another trend in this industry has been the rapidly expanding VAR marketing and support programs of many independent software companies, in particular developers of relational data base management systems (RDBMSs) and network-operating systems

software. Certain applications software companies also have developed such VAR programs as alternative distribution channels.

Other groups that are developing value-added reseller product divisions or subsidiaries include professional services companies and noninformation service companies that have developed internal turnkey systems solutions that in turn these companies wish to market within their industry.

D

Research Methodology

INPUT methodology for data collection, analysis, and forecasting is depicted in Exhibit I-8. During the first half of 1989, INPUT conducted in-depth interviews with 500 information services vendors, including nearly all the 250 largest. The smallest of the group of 250 vendors had about $22 million in revenues in 1988.

Revenues of the smaller 250 companies ranged from $250,000 to $22 million. Collectively, revenues from all 500 companies represented 65% of total information services industry revenues.

Companies that are not exclusively involved in information services are identified as follows:

- If a division or a subsidiary that markets all information services for a company is generally known by its own name, then it is identified by the division name rather than the parent company's name. One example is Boeing Computer Services Company, a division of the Boeing Company.

- If more than one division or subsidiary markets information services, the information is included in and identified by the parent organization's name. An example is Control Data Corporation.

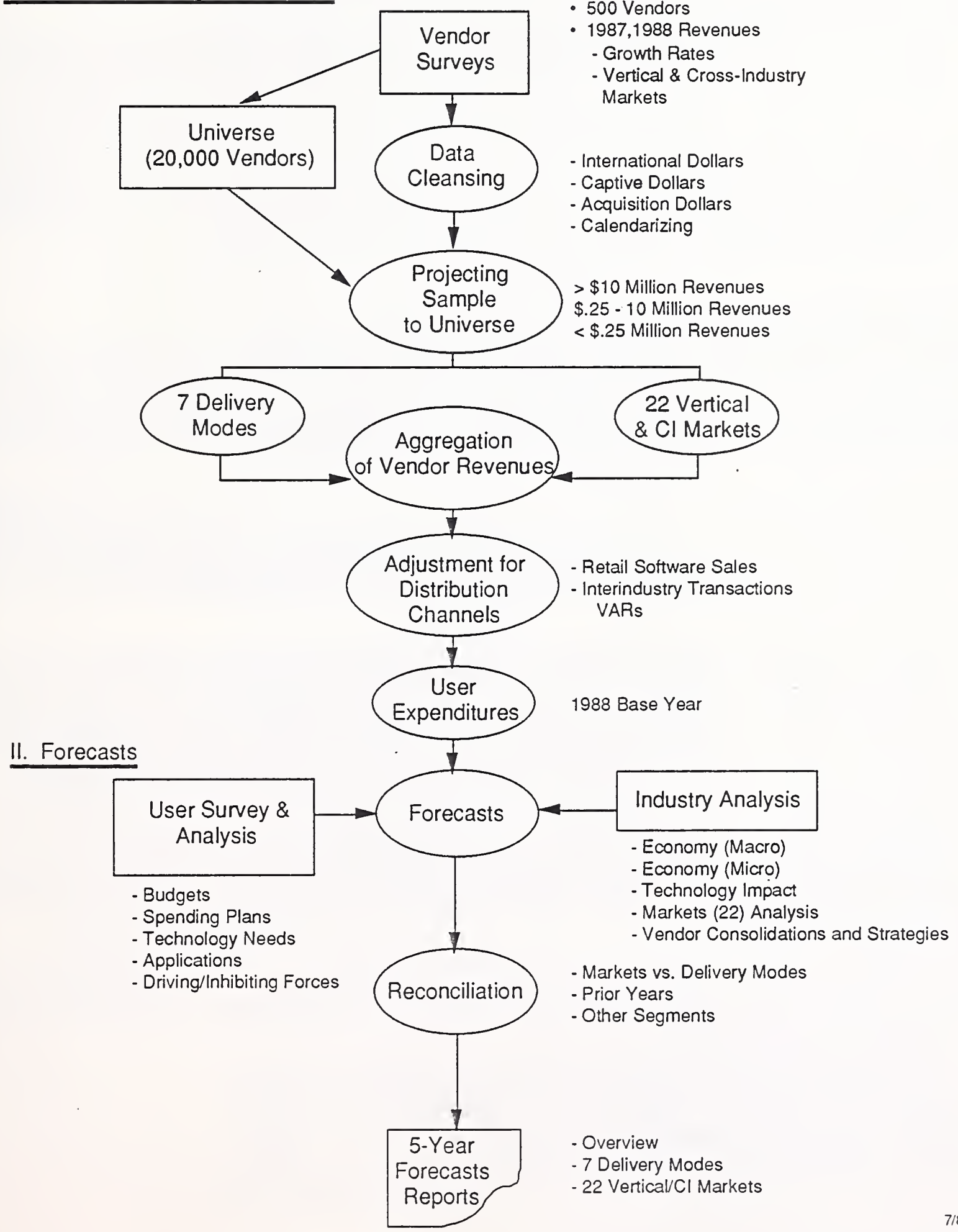
- Organizations are reported according to their legal status as of December 1988.

Companies have been classified according to the delivery mode of service from which they derive the largest proportion of their noncaptive U.S. information services revenues.

In the case of the few very large vendors that did not respond to our survey, INPUT estimated vendor revenues from its own contacts and secondary sources. These estimates were then mailed to the CEO for verification. This process was done for all companies with more than $10 million in U.S. revenues in any one delivery mode. For companies with revenues below $20 million (and not specifically covered in the survey), INPUT created a model based on the number of such companies identified in each delivery mode and their expected average annual revenues.

EXHIBIT I-8

INPUT Research Methodology



For each company, INPUT subtracted revenues identified as:

- International (non-U.S.)
- Captive (within the organization)
- Acquisitions-related

These surveys and estimates produced the initial vendor revenue estimates for 1988. Total base year (1988) revenues are then summed into six delivery modes and fifteen vertical and seven cross-industry segments for closer analysis and five-year projections. The revenue data in this report provided for individual companies include only the following:

- U.S. revenues. Revenues derived from products or services sold in the U.S.

- *Processing services revenues*

- *Noncaptive revenues.* Revenues available to all vendors in an open, competitive marketplace. Revenue derived from sales to a partner or affiliated organization is excluded. An example would be the sale of processing services from Litton Computer Services to another Litton division.

- *Calendar year revenues.* Approximately 30% of the vendors surveyed have fiscal years that do not coincide with calendar years. Revenues of these companies have been adjusted to a calendar-year basis for consistency.

For certain delivery modes, vendor and user expenditures are fairly close. However, many microcomputer software products, for example, are marketed through indirect distribution channels such as retail stores, OEMs, and value-added resellers (VARs). In these cases, conversion factors must be applied to determine the total market size based on vendor revenues. In addition, some software is sold by vendors into other information services sectors, such as processing services and network services. This software may be used in these other IS sectors' data centers and never be passed to the end user. INPUT deletes such intraindustry transactions from its user expenditure market data.

The following table shows the various conversion factors used by INPUT to convert vendor revenues to user expenditures (market size) figures for each delivery mode:

• Applications software products	1.18
- Systems software products	1.10
- Turnkey systems	0.95
- Systems integration	0.99

• Professional services	0.99
- Network services	0.99
- Processing services	0.99

For the 1988 user expenditures defined, INPUT projects five-year market growth rates for each delivery mode and vertical/cross-industry market, based on INPUT's own analysis of technology, vendor activity, and driving and inhibiting forces affecting each market and the U.S. economic outlook.

E

Economic Assumptions

Forecast numbers are presented in then-current dollars (i.e., 1994 market sizes are in 1994 dollars). In developing the five-year forecast, INPUT has incorporated the following economic assumptions regarding the outlook for the total U.S. economy.

As shown in Exhibit I-9, real GNP growth is projected to decrease from an anticipated 2.8% annual rate in 1989 to a range of 2.0% to 2.5% over the next five years before returning to approximately 1989 levels in the second half of the 1990s. In addition, the inflation rate, as measured by the GNP deflator, is expected to increase modestly to a projected annual rate of 4.5% to 5.5% between 1989 and 1994.

EXHIBIT I-9

GNP Nominal Growth Rate Assumptions (Percent)

	1988A	1989E	1990E	1991E	1992E	1993E	1994E
Real GNP	4.4	2.8	2.5	2.3	2.0	2.0	2.0
GNP Deflator *	3.0	4.8	5.2	5.5	5.0	4.5	4.5
Nominal GNP	7.4	7.6	7.7	7.8	7.0	6.5	6.5

* Year-to-Year Comparison
A = Actual
E = Estimate

Primary expectations affecting INPUT's outlook for nominal GNP growth rates over the next five years include a continuing slowing in consumer spending, modest increases in real consumer income; further slowing in the rate of increase in federal defense spending; the need to reduce the federal budget deficit; and product cycle maturation in certain key technology sectors.

Historically, the information services industry has been more resilient to slowdowns in real GNP growth than have companies in the electronic components and equipment sectors. However, the ability to pass on inflationary pricing pressures is more varied in the information services industry, because of the particular labor/material mix in the cost structure of individual delivery modes.

The turnkey systems industry is more vulnerable to a slowing in real GNP growth than the other delivery modes in the information services industry. See Exhibit I-10. This reflects the significant percentage of computer equipment involved in most turnkey systems sales. The more fragmentary nature of this industry also reduces the capability to pass along inflation cost pressures. In addition, the turnkey systems industry is characterized by a large number of smaller companies, many of which are undercapitalized and find it hard to survive economic slowdowns. The new-issues public stock market has not been particularly receptive to VARs, so this source of capital has not been available. However, a counterbalancing force in the market is the move on the part of many large computer systems companies to emphasize total-solution (turnkey systems) selling. But this emphasis also creates a strong new competitive force in the turnkey systems markets. The entry of such larger companies into the turnkey systems market will expand the potential market but also will likely displace many of the current vendors.

EXHIBIT I-10

Price Deflator for the Turnkey Systems Company Market
(Percent)

	1988A	1989E	1990E	1991E	1992E	1993E	1994E
Real Growth	11.5	8.6	6.4	7.2	7.5	7.7	7.7
Price Deflator	1.5	2.4	2.6	2.8	2.5	2.3	2.3
Nominal Growth	13.0	11.0	9.0	10.0	10.0	10.0	10.0

A = Actual
E = Estimate

F

Scope

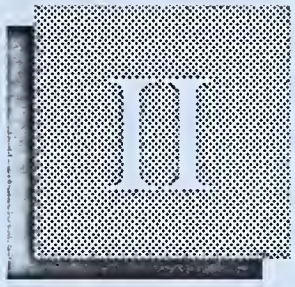
The report reviews the U.S. market for events, issues, and developments that impact the turnkey systems market. User expenditures provided are noncaptive—i.e., made to organizations outside the control of the spending organization. These expenditures are therefore available to any vendor.

The report is organized into five chapters, as follows:

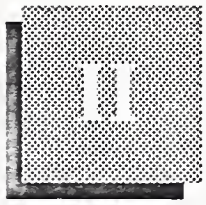
- Chapter II is an executive overview of the material presented in the entire report. This overview is designed for the executive or individual who requires the major/significant material.
- Chapter III presents the five-year market forecast (1989-1994) and analyzes the turnkey systems market in terms of the industry-specific and cross-industry sectors.
- Chapter IV provides a discussion of events, trends, and issues that are driving the markets.
- Chapter V looks at the competitive structure of the turnkey systems marketplace and provides rankings of the leading turnkey systems vendors by size and by growth.
- Chapter VI profiles various turnkey systems supplier strategies of independent software companies.
- Chapter VII provides insights into VAR support strategies of IBM, DEC, and Compaq.
- Chapter VIII provides conclusions and recommendations.
- Appendix A contains the INPUT definitions for terms used in the report.
- Appendix B contains the market forecast data base, which shows market sizes and growth rates used in the report.
- Appendix C provides a reconciliation between INPUT's 1988 market forecast for the turnkey systems market (made in the 1988 Information Services Industry Report) compared to the market size in 1988 as determined in INPUT's 1989 market survey results. A current five-year market forecast is also provided and reconciled with INPUT's five-year market forecast made in 1988.

Appendix D is INPUT's Information Services Industry 1989 Questionnaire.

Appendix E is the Value-Added Resellers Questionnaire.



Executive Overview



Executive Overview

A

Information Services Market

INPUT subdivides the information services market into six delivery modes: software products, network/electronic information services, processing services, professional services, systems integration, and turnkey systems.

Of these six delivery modes (markets), the fastest growing in 1988 was network/electronic information services at 25%. The slowest growing were turnkey systems and processing services at 12%. In 1988 the information services market increased to $80.2 billion, reflecting a growth rate of 19% from 1987.

INPUT is projecting a 15% compounded annual growth rate (CAGR) in the information services industry for 1989-1994. These market size figures are in current dollars, reflective of an inflation rate in 1988 of 3.0% as measured by the GNP price deflator. INPUT projects an acceleration in this inflation rate index to a range of 4.5% to 5.5% over the next five years.

B

Turnkey Systems Market

The turnkey systems market in 1988 was $9.6 billion. Growth in the turnkey systems market varies by market size, with the larger companies in the industry (as tracked in INPUT's index of public turnkey systems vendors) growing at an annual rate of 11% in 1988. As shown in Exhibit II-1, the CAGR for these companies is projected to be 9% over the next five years. These companies are generally the older companies in the industry, and provide more of a standard application software product as part of a total turnkey systems solution.

The majority of turnkey systems companies are primarily value-added resellers (VARs) with revenues under $3 million. These tend to be relatively young companies with a customized application product offering. The higher growth rate of this group of turnkey systems companies reflects both the statistical impact of growth from a small revenue base and the higher growth rate of turnkey systems based on customized software products.

EXHIBIT II-1

Turnkey Systems Market Segmentation by Vendor Size

Size Category By 1989 Turnkey Systems Company Revenues ($ Millions)		Estimated Number of Vendors	Estimated Aggregate Revenues, 1989 ($ Millions)	Typical Revenues, 1989 ($ Millions)	Estimated 1989-1994 Growth Rate (Percent)
Large	10+	150	4,710	30	9
Small	2-10	1,300	4,067	3	10
Very small	.25-2	6,000	1,928	.35	12
Total		7,450	10,705	-	10

The smaller markets are also benefitting from the higher unit growth in PCs/workstations and the increasing penetration of turnkey systems automation solutions in the small to midsize business environments. Several of the leading workstation and personal computer manufacturers—such as Sun Microsystems, Apple Computer, and Compaq Computer—initiated aggressive VAR recruitment programs in 1987-1988. These programs reflected a perceived need to use third-party marketing to more cost-effectively market lower-priced computer systems.

Most turnkey systems vendors now tend to focus on industry-specific (vertical) markets. The largest turnkey systems vertical markets are discrete manufacturing, banking and finance, and medical. INPUT projects that the fastest growth in the vertical market group will be in telecommunications, state and local government, and process manufacturing. Other markets that should provide above-average growth potential over the next five years include: discrete manufacturing, and, within the medical sector, alternative health care delivery modes.

The CAD/CAM product sector, which is expected to continue to be one of the higher growth turnkey systems product groups, is included in both the industry-specific manufacturing and cross-industry engineering markets. In 1988, companies in this product sector, such as Intergraph and Mentor Graphics, represented the strongest revenue growth within the larger turnkey systems market tier. Desktop publishing also was a strong growth market for turnkey systems solutions in 1988.

INPUT subdivides the turnkey systems market into four submodes: equipment, packaged software, custom software, and support. Of the total turnkey systems market in 1988, equipment represented 54% of the total market, with the second largest segment being packaged software. However, by 1994 the equipment portion of turnkey systems sales is expected to decline to 46%, with custom software and support services showing gains. The portion of turnkey sales represented by packaged software is also expected to show an increase. Details are in Exhibits II-2 and II-3.

The peripheral add-on market has been strong for turnkey systems companies in recent years, partly due to the fact that the open-architecture IBM PC and the PC clone manufacturers did not include hard disk storage in many of their personal computer products. In addition, Apple Computer's introduction of the open-architecture Mac II in 1987 was another boon to those seeking to expand hardware add-on revenues. However, IBM is now shipping most of its PS/2 personal computers with hard disk drives and greater RAM memory. In addition, the market for memory upgrades from floppy disk to hard disk storage also probably peaked in 1988.

Also, many other hardware products are becoming commodity products with lower prices and profit margins. As a result, for turnkey systems revenues to grow and for profit margins to increase, greater emphasis will have to be placed on software sales and services.

For the smaller vendors, the difficulties in pursuing a customized application software strategy will increase substantially over the next several years. This reflects, in particular, the complexity of new product requirements such as the need to provide a more-integrated product based on RDBMS architectures as well as multivendor connectivity. Historically, many of the companies in the turnkey systems market have financed much of their software application development through profits made from the hardware portion of their turnkey systems solution. As the profit margins from the equipment portions continue to decline, alternative sources for new capital to fund new product development become a major issue.

EXHIBIT II-2

Turnkey Systems Market by Component—1988 and 1994

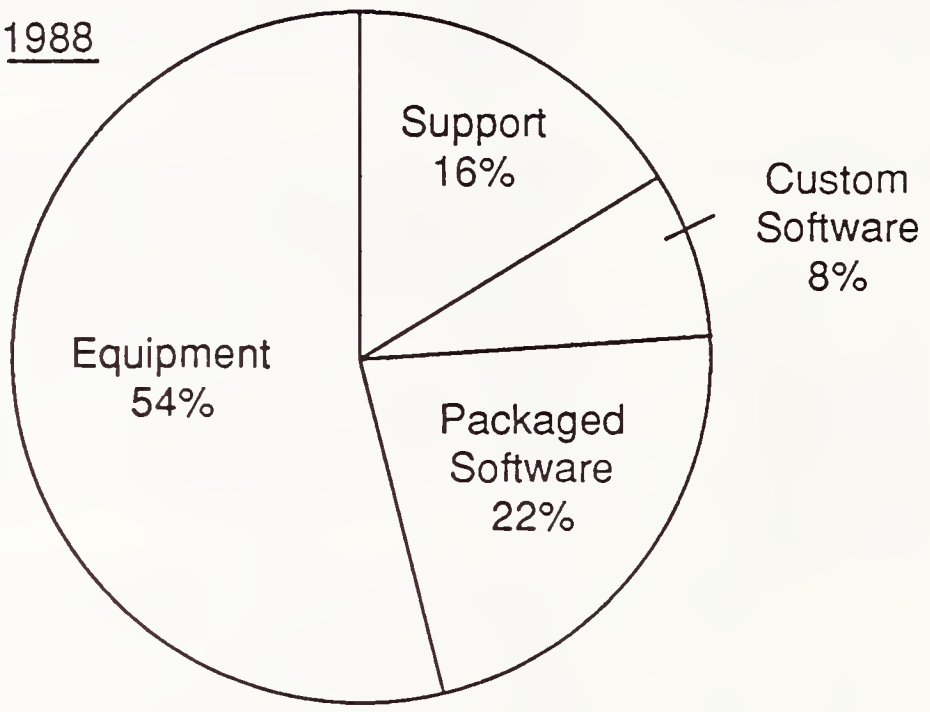
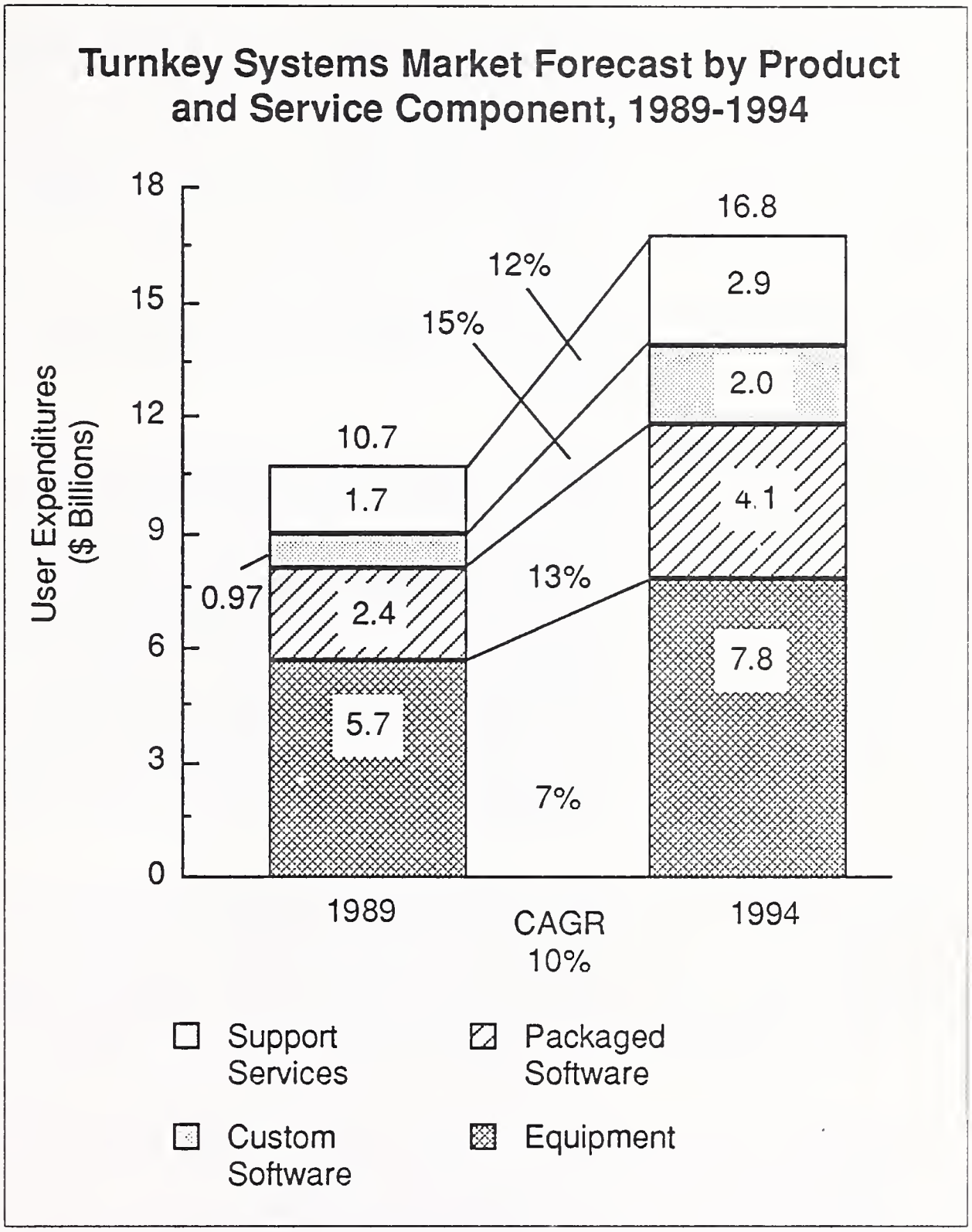


EXHIBIT II-3



A lower-cost, lower-risk source of new software products could be to cross-license software from other companies; establish value-added reseller agreements with independent software companies; and establish "business partnership" strategic alliances with computer systems manufacturers. An acquisition policy for acquiring other turnkey systems companies might also be considered.

Chapter VI of this report includes profiles on independent software companies which INPUT views as representing software company suppliers to value-added resellers who have a combination of strong product and support services. In particular, certain of the companies with application development tool technology could help substantially reduce

the cost of new product development, as well as address the issue of providing multivendor connectivity and portability of product.

A related trend observed by INPUT is that of unbundling among traditional turnkey systems vendors with a product transition to software and services. Many of these companies, as well as independent software vendors, are developing strategic alliances with computer systems vendors, where joint marketing is replacing the reselling approach. Reselling is defined as taking title to the equipment and software and adding value to the product. Joint marketing can involve referencing of the software vendor by the computer systems vendor or joint marketing calls.

For the mid- to large-sized turnkey systems vertical markets, INPUT believes that joint marketing is often the preferred method. Both types of companies can maximize their product and marketing strengths from the synergy of a total solutions joint presentation. Also, if the client has a preference for either the equipment or the software, the sale can be lost for both types of companies if the benefits of the total solutions from the combined products are not properly presented. Often one company representing half the solution cannot effectively present the benefits of the combined software and equipment solution. Also, the education and training of the sales staff can be leveraged by joint training of both the equipment and software company sales teams.

Many types of software products, particularly in the cross-industry markets (such as accounting), are becoming commodity items with very similar functionality. For the larger turnkey systems vendors that have emphasized a single-market, standardized application product strategy, an emphasis on licensing of new product and/or providing interfaces to other standard solutions presents some alternative product strategies. However, the major potential market for turnkey systems vendors is the current in-house and combined customized solutions product market. For software product development, INPUT estimates that between 55-90% of new application development in the various vertical markets is done either by internal resources only, or a combination of internal and external resources.

Particularly for larger vendors with the resources to address the needs of large customers, there is increasing emphasis on providing a customizable solution, to penetrate a larger portion of the "available" software and solutions markets. Approaches to this market can include more emphasis on systems integration for highly customized product delivery; software products developed with 4GL/CASE/RDBMS tools, which can enhance product development and maintenance productivity; and turnkey systems with professional services.

Professional services support is particularly effective for account control as well as for maximizing revenue potential from the individual customer. Service extensions include greater emphasis on product customization, consulting, IS system operations, education/training, maintenance, and systems integration solutions, such as multivendor networking. The particular area of new support services most frequently emphasized in INPUT's survey of turnkey systems vendors is education and training.

A lower-risk strategy for increasing professional services could be for the turnkey systems vendor to create an alliance with a professional services company with expertise in its particular markets.

The longer-term growth in the turnkey systems market is projected to remain approximately the same as in recent years, in the range of 9-12%. Although the cost/performance impact on hardware revenues will substantially slow revenue growth in the equipment segment, the continuing shift in product emphasis to software products and professional services should help sustain revenue growth for the total turnkey systems market. In addition, the entry of newer types of turnkey systems vendors (representing, in many cases, large companies with considerable marketing strengths) should help drive market growth. However, to some extent these newer market entrants will displace some of the current vendors who have fewer financial and marketing resources.

C

Turnkey Systems Competitive Environment

Turnkey systems suppliers are facing increasing competition from computer systems vendors, professional services companies, systems integrators, and computer retailers who are providing more complete applications solutions. In particular, among leading computer systems vendors, IBM's creation of its Applications Software Development Division heralds a major new emphasis on application-specific software.

The turnkey systems solution, expanded to include a more multivendor, systems integration approach, could very well become the dominant marketing approach of the leading computer systems and independent software companies in the 1990s. This implies that turnkey systems solutions and systems integration will expand as marketing approaches, but the degree of competition will also increase significantly as the information services industry in general shifts to a more integrated services marketing approach.

This will require specialized product and marketing strategies on the part of the independent turnkey systems companies in order to survive in the changing structure of the marketing environment.

D

Turnkey Systems Vendor Strategies

Over the past few years, the following strategic approaches have proven successful among various turnkey systems vendors:

- For larger turnkey systems vendors:
  - A shift from providing proprietary hardware to more use of standard hardware platforms (a significant exception is Intergraph)
  - Emphasis on new product development and/or acquisitions to increase potential available market
  - Participation in vertical, niche markets of substantial size (more than $100 million)—and being able to establish dominance in the chosen niche market
  - Customizable application software (with unique functionality) as a principal competitive approach
  - Increasing emphasis on services such as consulting, maintenance, education/training, and leasing
  - Unbundling of software and hardware for certain market niches to maximize return on assets
  - Emphasizing financial controls and the bottom line
  - Downsizing of system platforms from minicomputers to workstations/PCs
  - Utilizing joint marketing agreements to leverage marketing strengths in particular market channels
  - Emphasizing the current customer base for a recurring revenue source
- For the smaller turnkey systems vendors:
  - Proprietary product strategy that gives protection from larger independent software companies—including becoming known as an expert in a particular market niche
  - Specialization, perhaps in services—i.e., becoming a systems integrator or systems operator/facilities manager for smaller businesses
  - Use of cross-matching from other turnkey systems companies and independent software developers to obtain additional products and increase the breadth of solution provided

- Emphasis on the current customer base for recurring revenue from product add-ons and services such as consulting, education/training, maintenance and facilities management

Company profiles in Chapter V include discussion of some of these strategies.

E

Recommendations for Future Success

With a future turnkey systems market characterized by increasing competition from other types of companies, survival strategies for the independent turnkey systems company will require more emphasis on value-added products and services, specialization, customization, and having the resources to dominate chosen niche markets.

Particular recommendations include:

- Focus on services such as consulting, systems integration, education/training and software customization that tie the customer to the turnkey systems vendor.

- Work with suppliers that consider the value-added reseller channel as crucial to their marketing and which emphasize product support for both the vendor and the customer base. Also look to platform and software suppliers who view their turnkey systems companies as business partners with the possibility of product development information exchange.

- Emphasize the current customer base with state-of-the-art software product additions, data base services and peripherals to provide stability of revenues and earnings (important to investors and creditors) as well as a lower marketing cost.

- Use application development tool technology such as 4GL/DBMS/CASE products to provide integrated product delivery around a standard RDBMS, as well as to enhance software development productivity.

- Establish strategic alliances through marketing partnerships with companies strong in complementary markets.

- Make increased use of standard platforms (open architecture), to increase software portability and profit life cycles through add-ons and product upgrades.

- Consider the UNIX operating system, particularly as a lower cost, multiuser alternative in a networked environment, and also for software portability.

- Develop a specialized knowledge in a systems integration discipline such as network integration, which includes multivendor connectivity as well as the ability to integrate voice, data, text, image and video information.

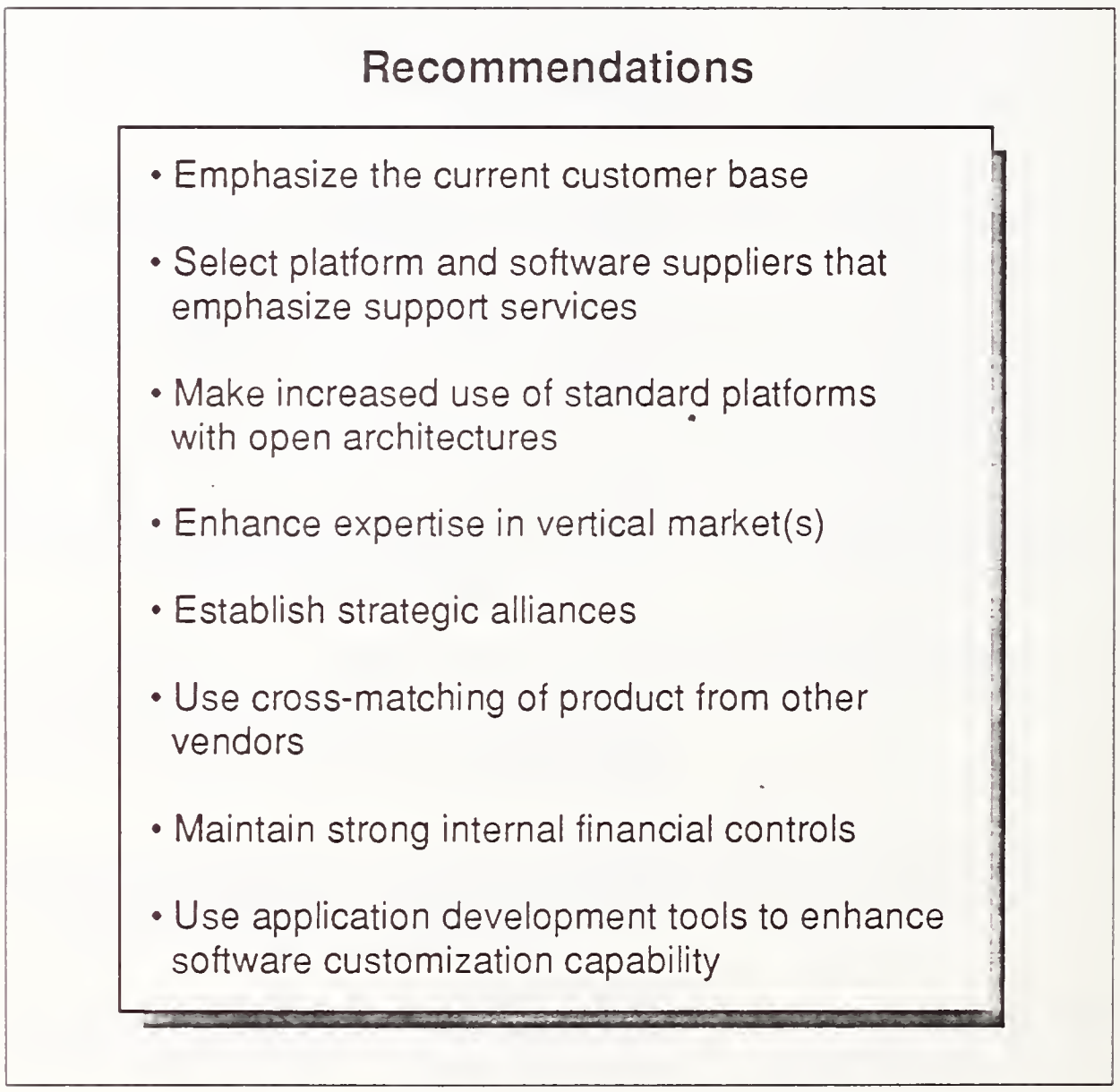
- Develop unique product enhancements, such as built-in intelligence, through expert systems development technology.

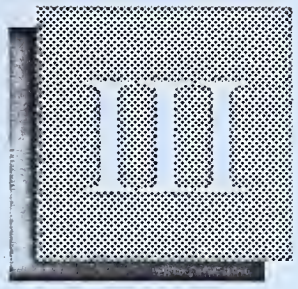
- Stress internal software development along with strategic alliances and other forms of product cross-matching to increase breadth and depth of solution to targeted industry markets.

- Emphasize maintenance of strong internal financial controls.

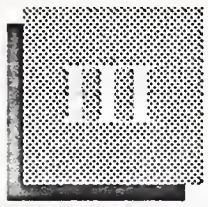
These recommendations are summarized in Exhibit II-4.

EXHIBIT II-4





Market Size and Forecast



Market Size and Forecast

A

Market Forecast

INPUT projects that the total information services market will expand at a 15% compound annual growth rate over the next five years, from $92.1 billion in 1989 to $187.6 billion in 1994. This represents a change in INPUT's 1988 growth rate forecast for the information services market of 17%.

In 1988, the information services market totaled $78.7 billion, representing a 17% growth rate over 1987.

The modest decline in the anticipated compounded annual growth rate (CAGR) for the information services industry primarily reflects INPUT's slight reduction in its projection for real GNP growth over the next five years and reduced growth expectations for the PC/workstation market from the 1988 forecast. INPUT is now projecting revenue growth for the PC/workstation market at a 15-20% CAGR over the next five years, compared to a five-year projection in 1988 of a 20-25% CAGR.

1. Five-Year Outlook: 1989-1994

The turnkey systems market in 1988 totalled $9.6 billion, compared with $8.6 billion in 1987, which reflects an annual growth rate in 1988 of 11%. INPUT had projected a 1988 market size of $9.5 billion for the turnkey systems in last year's turnkey systems annual report. INPUT's Process Manufacturing Industry Sector Report in 1988 included approximately $735 million in additional expenditures for supervisory plant floor central systems, which will expand to an estimated $1,490 million. This market segment is not included in the total market size figures for process manufacturing in this report because supervisory control systems expenditures were not counted in the discrete manufacturing and utilities markets in INPUT's 1989 market survey.

Beginning in 1990, INPUT will include plant floor supervisory central systems, where they are sold as turnkey systems solutions, in all appropriate vertical industry reports.

Exhibit III-1 segments the turnkey systems market into levels by company size. The larger turnkey systems vendors are growing at a slower rate than the smaller companies, reflecting the statistical impact of their larger revenue base as well as the higher growth rate in the custom software market, which is a more common product strategy of the smaller turnkey systems companies.

EXHIBIT III-1

Turnkey Systems Market
Segmentation by Vendor Size

Size Category By 1989 Turnkey Systems Company Revenues ($ Millions)		Estimated Number of Vendors	Estimated Aggregate Revenues, 1989 ($ Millions)	Typical Revenues, 1989 ($ Millions)	Estimated 1989-1994 Growth Rate (Percent)
Large	10+	150	4,710	30	9
Small	2-10	1,300	4,067	3	10
Very small	.25-2	6,000	1,928	.35	12
Total		7,450	10,705	-	10

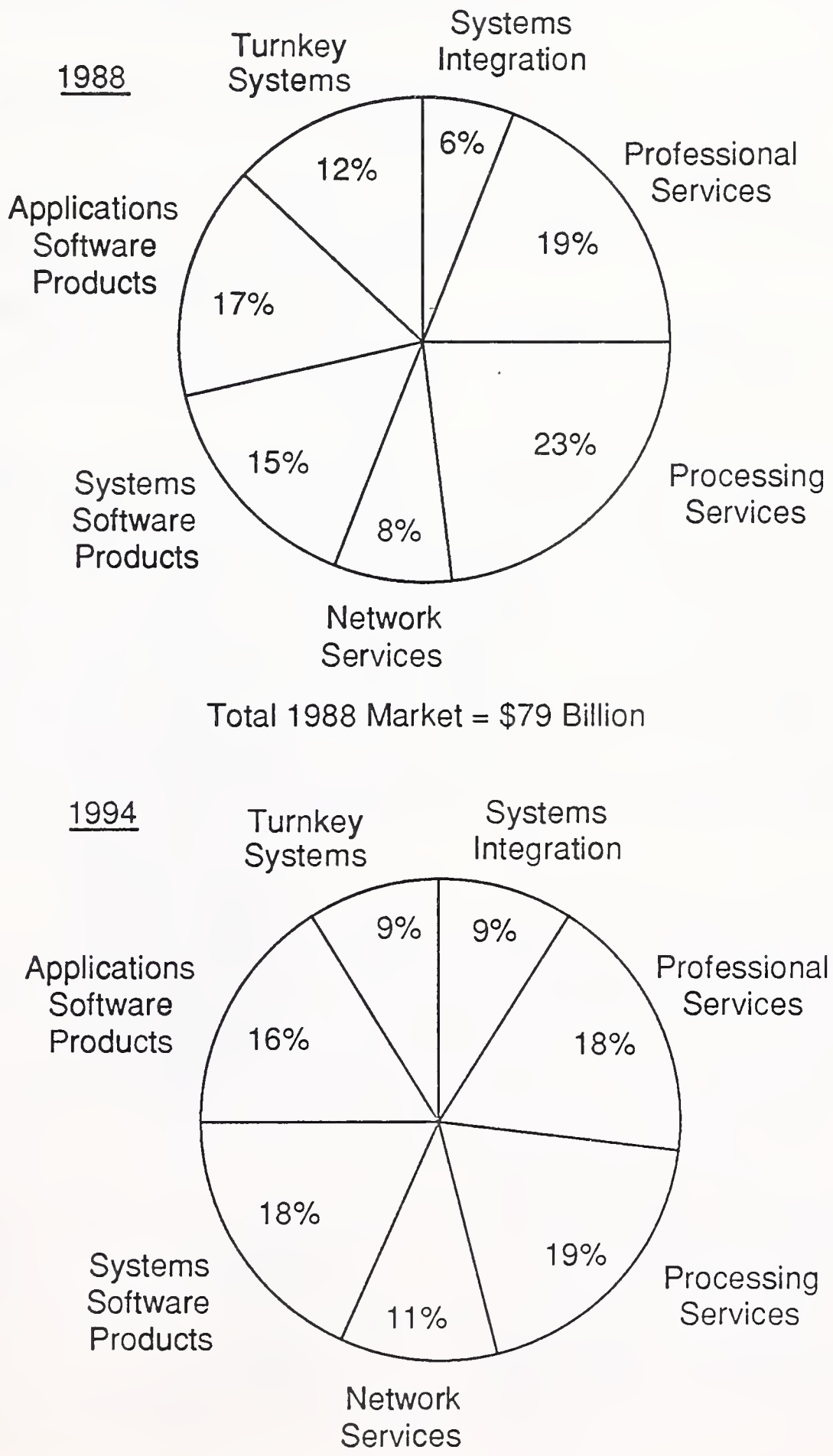
INPUT is projecting a compound annual growth rate (CAGR) of 10% in the turnkey systems market from 1989 to 1994. This is the same five-year CAGR for the turnkey systems market that INPUT projected in 1988.

The forecasted market size figure for 1993 was $15.2 billion. The current 1993 market projection has been increased to $16.8 billion as a result of an increase in the 1988 base.

The projected growth rate for the turnkey systems market is the slowest of the six delivery modes tracked by INPUT as part its analysis of the total information services market. (See Exhibit III-2.) INPUT is projecting that overall, the information services industry will expand at a CAGR of 15% from 1989-1994.

EXHIBIT III-2

Information Services Market by Mode of Service—1988 and 1994

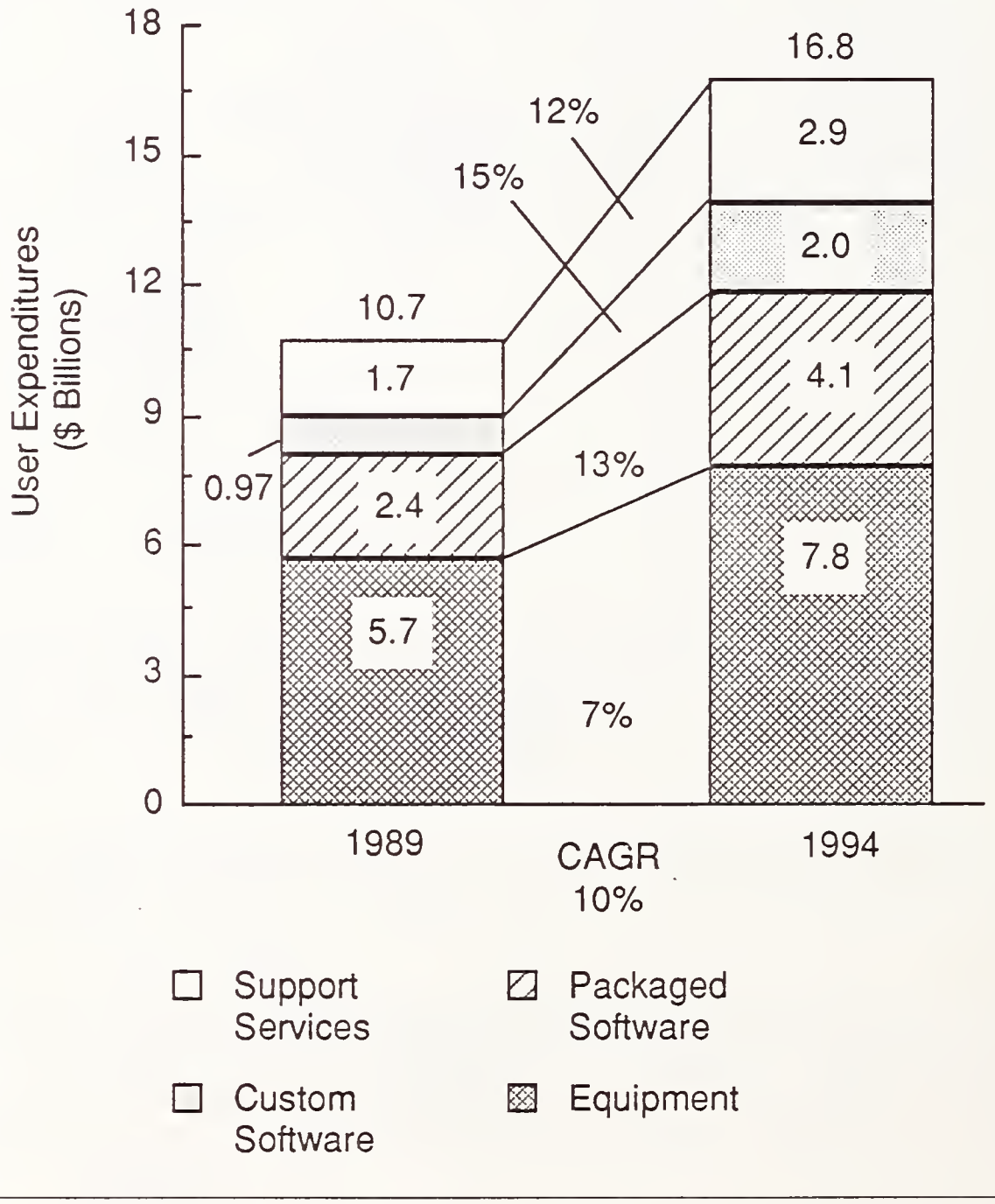


In sizing the turnkey systems market, INPUT divides the market into four principal submodes: equipment, packaged software, customized software, and support services (education, training and maintenance). Equipment is further subdivided into workstations/PCs, minicomputers and mainframes. In addition, fifteen industry-specific sectors are sized as well as seven cross-industry sectors.

A major growth inhibitor in the turnkey systems market is the declining growth rate in the equipment segment, because of price/performance improvements.

EXHIBIT III-3

Turnkey Systems Market Forecast by Product and Service Component, 1989-1994



The PC/workstation equipment subsegment of the turnkey systems market is projected to expand at a 14% CAGR, which will reflect a continued trend to the client/server model with the workstation representing a preferred solution, based on relative price/performance characteristics. The minicomputer equipment VAR subsegment growth rate for the same time period is projected to be relatively flat.

Packaged software, which has been the primary method of providing turnkey application solutions, will grow at a 12% CAGR. The more rapid 16% growth rate in customized software reflects the growing demand for solutions tailored to customers' individual requirements. Customized software is a principal application marketing approach of the smaller, faster growing turnkey systems companies.

The 12% growth rate in support services includes consulting, education and training, and software support and maintenance not specifically included in the system's purchase price.

A trend to unbundling of hardware and software, with the traditional turnkey systems company moving more towards the software products and professional services markets, is expected to continue. This is evidenced today by companies such as Interleaf, among the larger turnkey systems companies, as well as in the increase in the numbers of business partner relationships between software developers and computer equipment vendors. The latter reflects the trend to joint marketing, where the VAR does not take ownership of the equipment. Such arrangements, which are more in the nature of strategic alliances, are not classified as VAR relationships. INPUT's definition of a VAR is a company which takes title to equipment and software from a vendor and adds value to the product.

The increase in total solutions marketing strategies by computer systems vendors, where software represents an ever-larger part of the total sale, also has a potential downside for traditional turnkey systems suppliers. The expected continued slowing in revenue growth rates and profitability on hardware sales is forcing manufacturers to seek company growth from providing more software applications and related services. In addition, services-oriented professional services and systems integrations companies, along with value-added retailers, are pursuing the software and services opportunities in providing value-added solutions. However, the positive side to this, for turnkey systems suppliers, is that the independent VAR channel in many cases represents the most cost-effective method for computer systems manufacturers to sell to smaller businesses and localized markets. As a result, the past two years have seen a major effort by most of the leading computer systems vendors to court VARs, particularly as a way of selling lower priced hardware that won't support a direct sales effort.

Another factor negatively impacting the turnkey systems channel is market saturation in the smaller, vertical markets addressed. To expand the potential market often requires significant capital resources, to develop new products and expand beyond a local geographic market focus. Many of the smaller VARs have seen profit margins squeezed in recent years, and thus are not generating the funds necessary to continue to upgrade products and expand geographic coverage.

This suggests that for many turnkey systems suppliers, some fundamental changes in product and marketing strategies will be required in what has become a much more challenging competitive environment with relatively modest profit margins for most participants.

2. Industry-Specific versus Cross-Industry

The primary targeted market of turnkey systems suppliers is one or more industry-specific markets, and usually specific niche segments within such markets. Examples include hospital management, physicians' group practice and insurance agency systems.

The turnkey systems industry-specific (vertical) market in 1988 totalled $7.1 billion. This represented 74% of total turnkey systems user expenditures. The cross-industry sector of the turnkey systems market totaled $2.5 billion in 1988.

As indicated in Exhibit III-4, INPUT projects that industry-specific solutions will continue to represent the larger and faster growth sector of the turnkey systems market over the next five years.

a. Industry-Specific Segmentation

Industry-specific turnkey markets are shown in Exhibits III-5a and 5b. The largest application/industry segments are in discrete and process manufacturing, based on computer-integrated manufacturing (CIM) applications strength, as the factory floor becomes automated. The second largest industry segment is in the banking and finance area, where cash management, trust accounting, and portfolio management systems have had considerable appeal. The third largest segment is medical, where hospital accounting systems, laboratory management systems and doctor/dentist office systems have been important application growth areas.

EXHIBIT III-4

Turnkey Systems Market by Industry Sector, 1989-1994

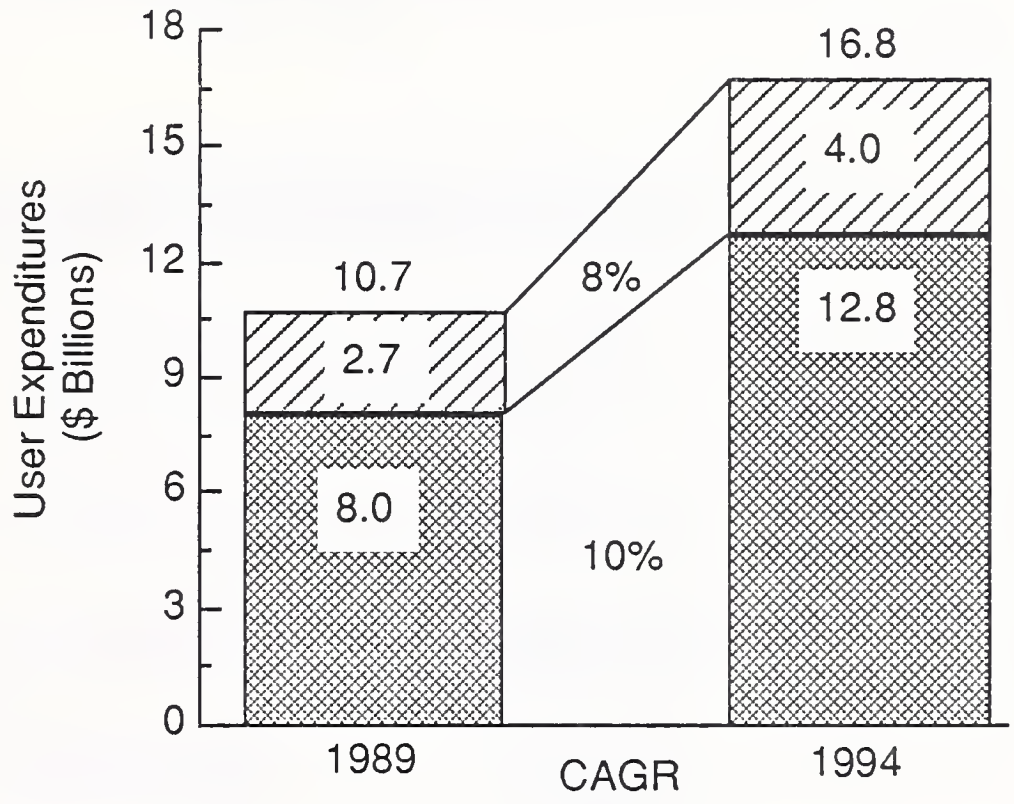


EXHIBIT III-5a

Turnkey Systems Industry-Specific Markets, 1989-1994

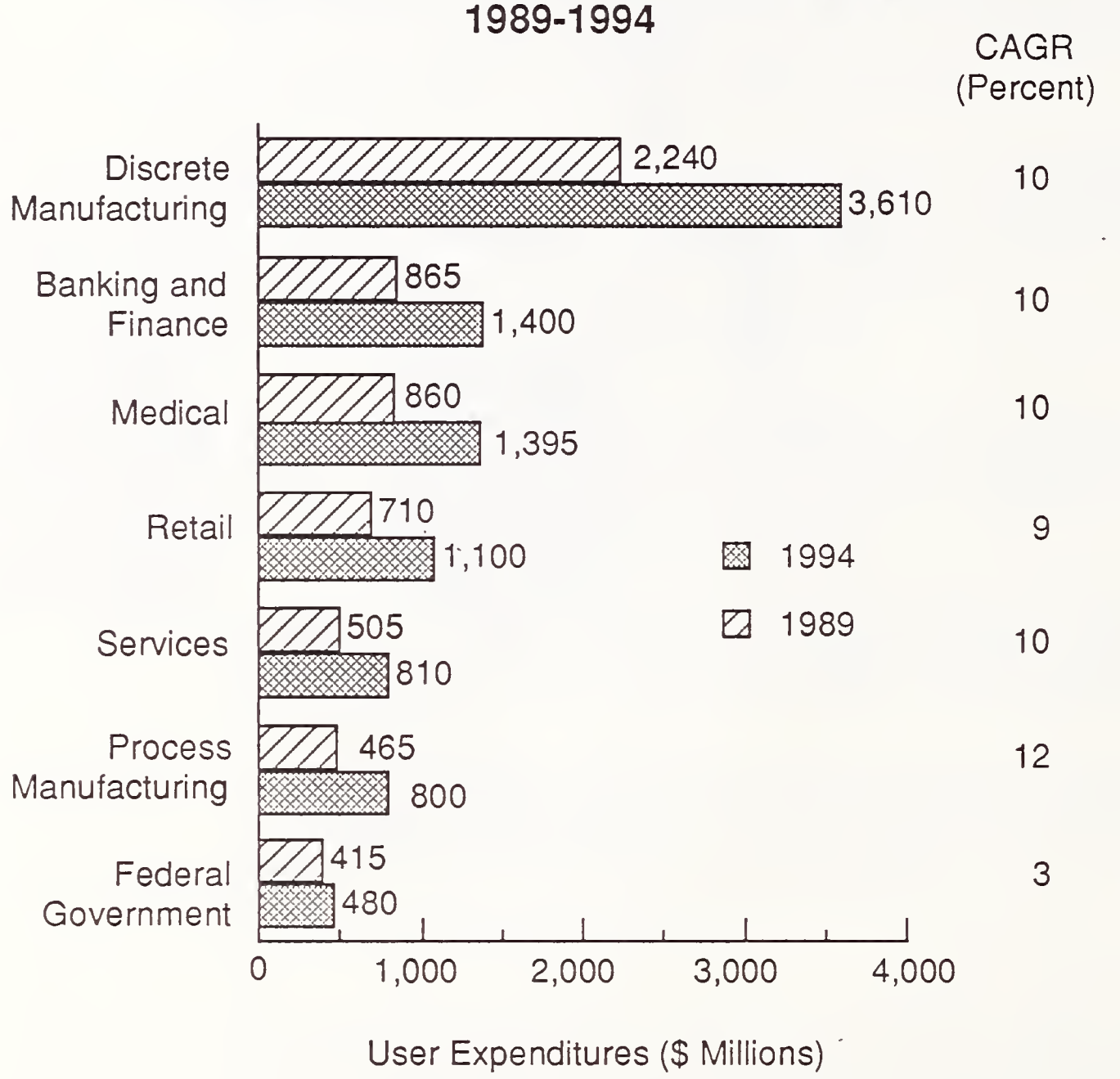
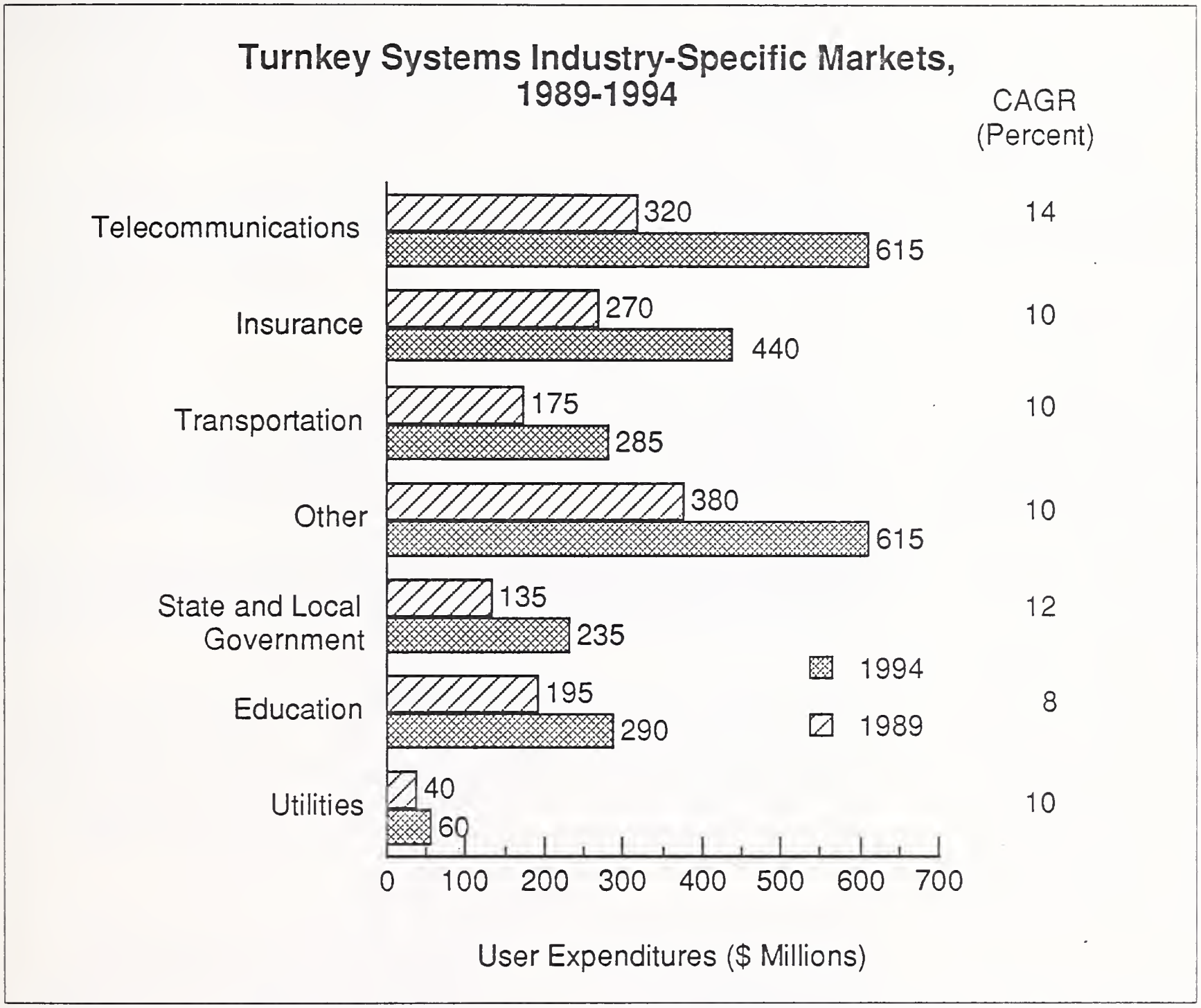


EXHIBIT III-5b



The strongest rate of growth over the next five years in the industry-specific turnkey systems market is projected to be in the telecommunications area, with a 14% CAGR. An emerging telecommunications turnkey systems growth market is voice processing. This growth reflects, in particular, the potentia. for marketing products to the Regional Bell Operating Companies (RBOCs).

Industry-specific revenues are generally growing at a faster rate than cross-industry revenues due to the greater maturity of many of the cross-industry markets.

In both the vertical and cross-industry markets, however, the fastest growing segments are in customized software and professional services, including consulting, education and training, and maintenance.

The opportunity to sell industry-specific applications is due in part to the lack of internal resources available to implement specific solutions at many small- to mid-sized companies. The turnkey systems company can become the technical expert and the information systems department for the application or system solution offered. Such a sale is based on an application's fit, form and function, as well as on service and training.

Turnkey systems, as sold through a VAR distribution channel, are an effective sales and marketing channel for many computer manufacturers. However, the managing of this channel and the deployment of a computer manufacturer's direct marketing/sales organization can produce conflict and channel cannibalization.

b. Cross-Industry Segmentation

The cross-industry markets include: accounting, education and training, engineering and scientific, human resources, office systems, planning and analysis and various others (including corporate publishing and cross-industry distribution/sales support products).

Although most cross-industry segments are growing at a slower rate than vertical markets, strong office systems and engineering/scientific markets are driving this market, as shown in Exhibit III-6.

Much of the recent growth in office systems has come from the word processing and spreadsheet markets, which are not included in INPUT's turnkey systems industry market. This market is maturing. Future higher growth potential exists in the desktop publishing, document management, text management and image processing segments of the office systems market.

INPUT believes that cross-industry applications will be increasingly included with industry-specific market solutions, as turnkey systems suppliers seek out additional software products to increase revenues by providing additional applications that can be marketed to both new and existing customers. This is accomplished by cross-matching, where turnkey systems VARs resell cross-industry and complementary products which are developed by other VARs and/or independent software developers. Some cross-matching also involves the reselling of new application software which complements existing industry-specific (vertical market) solutions. The latter could include, for example, an expansion of health care applications for hospital patient billing to inventory and fixed-asset management systems.

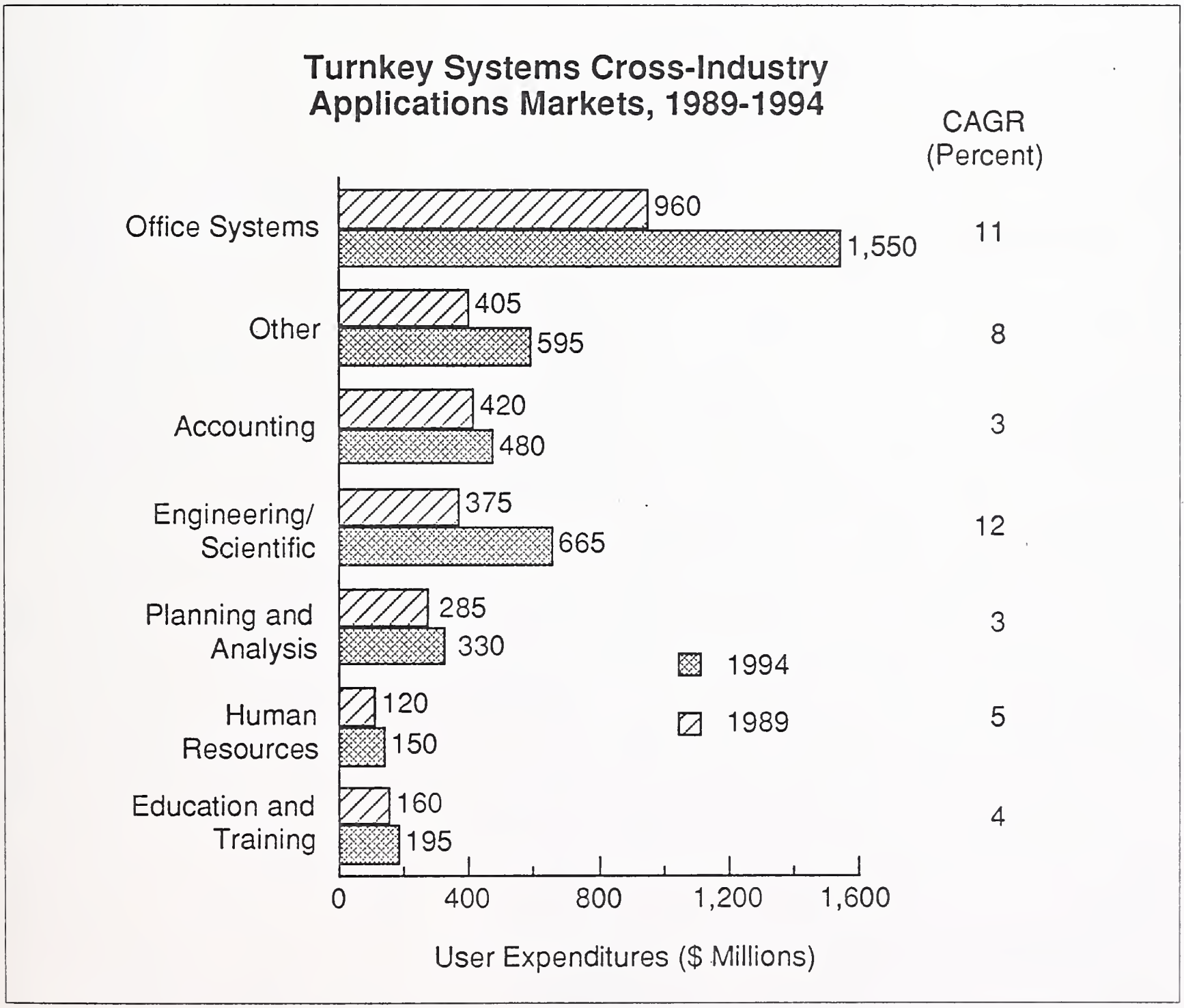
c. Custom versus Packaged Turnkey Applications

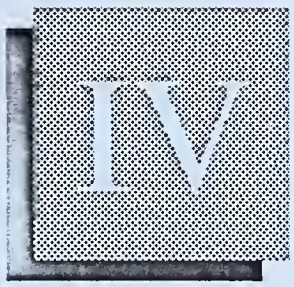
The custom turnkey solution meets basic user needs in the application system being offered, but also includes some special additions, modifica-

tions, and enhancements necessary to precisely meet the client's requirements.

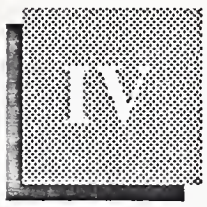
This may seem somewhat contrary to the definition of a turnkey system, which suggests an exact match already available by a vendor using a "cookie cutter" approach to sales/marketing. But by using a customized approach, the vendor can extract a higher price for meeting the user's needs. This requires extra effort to finish the application. It also raises the issues of maintenance and support due for the nonstandard parts of the application, and the slowing of propagation of the application system.

EXHIBIT III-6





Issues and Trends



Issues and Trends

A Summary

The turnkey systems industry is characterized by a few large companies with revenues in the several hundred million dollar range, and a large number of companies with revenues of less than $10 million. Among the larger companies are: Reynolds and Reynolds Company, Interleaf, Inc., Mentor Graphics, Intergraph Corporation, HBO & Co., ASK Computer Systems, Triad Systems Corp., ISC Systems, Compugraphics, C3, Inc., and Daisy Systems/Cadnetix.

Many of these larger vendors have a heritage which extends back into the early to mid-1970s, when they originally developed proprietary hardware as well as software solutions. The advent of the workstation industry in the 1980s, represented by vendors such as Sun Microsystems and Apollo Computers (now part of Hewlett-Packard), however, contributed to a change in the economics of providing proprietary hardware products. The efficiencies of large-volume production, and industry endorsement of "standard" solutions, created a difficult competitive environment for the turnkey system company's proprietary hardware platform. As a result, turnkey systems companies, slow to make the transition to standard hardware systems, suffered at least a temporary loss in product growth momentum. Probably the best example of this can be seen in the comparative growth trends of Mentor Graphics and Daisy Systems/Cadnetix, companies which are positioned in similar markets. Daisy was slow to make the transition to a standard hardware platform architecture, whereas Mentor Graphics was an early user of Apollo hardware.

However, there was also a negative side to the adoption of a standard hardware platform. This was the trend to commodity pricing of such hardware as the competition in the workstation and other computer systems markets increased. Many of these early turnkey systems vendors had obtained most of their gross margin from the value-added pricing of their proprietary hardware product.

Many of the early turnkey systems companies have gone through a number of strategic product and marketing shifts, dictated by such factors as the increasing use of standard hardware; market saturation in many of the niche markets, leading to slower revenue growth; declining profitability resulting from commodity hardware pricing pressures; and increasing competitive pressures from computer system vendors.

Those that have successfully made the transition from the early industry phase and continue to produce double-digit revenue growth and industry-competitive profit margins have tended to adopt many of the strategies listed below:

- Movement away from selling hardware, with the value-added component coming more from proprietary software and support services. With the rapidly increasing complexity of software product requirements, vendors will be required to market their software based on value-added pricing to be able to support higher levels of product development costs.

- A change towards the use of standard hardware/systems software platforms

- Use of cross-matching by turnkey systems vendors for additional software products from VARs and other third-party software developers

- Greater emphasis on expanding the breadth of offering to a particular industry-specific market

- Greater stress on support services, with some turnkey systems companies becoming IS managers for their customers—including on-site facilities management

- Increasing use of vendors as partners to help provide necessary support services to maintain account control, including training, cooperative advertising, and maintenance

- The development of strategic alliances between turnkey systems vendors and computer manufacturers pursuing industry-specific market channels

B

Trends and Issues

1. Channel Conflict

The increasing presence of equipment and software companies, distributors, agents/brokers and computer retailers in the turnkey systems/VAR marketing channel has made channel conflict a principal issue for independent turnkey systems vendors. This has led to a restructuring of many vendor/VAR programs to reduce this conflict, in an attempt to

maximize the benefits of utilizing third-party sales channels. Particular strategies involve the compensation of the direct sales account managers for leads to value-added resellers in their account territories, and more recently, the implementation of joint customer calls by the VAR and the vendor's direct sales force.

One approach to dealing with distributor-VAR channel conflict is to make it a partnership relationship, particularly for larger accounts. This will become increasingly important as vendors and their VARs find themselves competing with other vendor/VAR sales relationships in the trend to total solutions selling.

Previous restrictions on storefront computer dealers becoming value-added resellers are now being lifted by many computer vendors, which is making such dealers more formidable competitors to the traditional VARs. Such retailers often have a wider range of products and can provide more competitive pricing than the traditional VARs. MicroAge, Inc., for example, recently announced that it was repositioning seven company-owned stores to stress value-added sales as an alternative to high-volume, low-margin sales.

Because of these trends, many VARs are seeking additional vendor relationships which will broaden product offerings, so as to minimize such a competitive advantage.

2. Tiered Pricing

The use of Master VARs (usually a distributor or larger VAR) to service the smaller-volume resellers is on the rise by computer and software vendors.

An advantage for the smaller VAR is the ability to get better discounts from the Master VAR than from the vendor. Also a Master VAR can offer smaller VARs manufacturing, distribution and other vertical market-oriented software packages, as well make available its internal consulting team to advise VARs on connectivity and other product issues.

A disadvantage is that the Master VAR/distributor has the ability to address the VAR market directly, with lower prices than the smaller VAR. This has led to various restrictions being placed on Master VAR/distributors by many vendors, which require them to provide a value-added product dimension.

Vendors benefit from the use of Master VARs in that the distributor shares the cost of inventory and improves the efficiency of the vendor's production scheduling. It also gives the vendor immediate access to the presumed distributors' broad base of customers much more cheaply than through other distribution approaches.

Distributors becoming Master VARs today include traditional equipment distributors, leading software distributors, larger VARs, and more recently, distributors of electronic components.

Another example of tiered pricing is the larger discounts offered to the high-volume major franchise chains. This can creates a lower "street" price for value-added resellers to have to compete with, a problem which can be exacerbated by advertising promotions of the large dealers to move inventory.

3. Cross-Matching

Cross-matching by turnkey systems vendors involves the broadening of their software and hardware product offerings by initiating a number of software and hardware supplier relationships that can include third-party application developers, other VARs, applications and systems software houses, and peripheral manufacturers.

The principal benefits include the ability to leverage the customer base, increase the size of the initial systems sale, and to expand the potential addressable market.

More popular product extensions include enhanced application-specific products, office systems applications, spreadsheets, financial and other cross-industry applications, RDBMSs and related utility software, and disk drives. The acquisition of additional vertical market applications software, in particular, allows the VAR to extend market coverage and product knowledge to related markets (for example, expanding from hospital management to clinical applications), as well as to employ the network integration of such product offerings, which can significantly expand the potential size of the VAR's targeted industry-specific market. Also, the bundling of services can justify increasing sales pricing for consulting and systems integration services.

The use of RDBMSs as software development platforms by VARs allows for the development of integrated software offerings, which can provide a broad range of functionality, particularly for the smaller business market. The use of RDBMSs for product development can increase file integrity and transaction security.

A principal benefit of the systems and applications software companies is their ability to reach local and/or small business markets which cannot be cost-effectively addressed by a direct-sales force.

Cross-matching can also involve the porting of the VAR's software to a number of hardware platforms, or acquiring software from independent developers whose software runs on a variety of operating systems and

hardware. At times, this also involves selling only software to the end user, and allowing the end user to make the hardware decision independently of the VAR.

4. Turnkey Systems Companies' Product and Service Extensions

In order to increase revenues and profits and to provide a base of recurring revenues, many VARs are concentrating on providing add-on products and more services such as consulting, education and training, maintenance, and network integration to the installed customer base. These additions increase customer loyalty and prevent competitive encroachment from computer systems vendors and computer retailers/dealers, many of whom are also expanding service offerings. Repeat business also generally brings higher margins due to reduced marketing expense.

Hardware maintenance should probably be left to the hardware vendor or to a third-party maintenance provider, due to the high cost of carrying inventory for maintenance purposes. The emphasis should thus be more on software maintenance, which can include education/training, integration, product upgrades, implementation, and IS services. For the larger VARs, a customer-leasing program could also be considered.

An attendant issue is proper pricing of the support services. The margin of profitability obtained from providing such services should be compared with any commissions made from selling vendor support programs. The use of third-party maintenance services should also be considered, which helps to minimize channel conflict related to vendor-provided support services.

Increased marketing focus is being placed on the installed customer base, to reduce marketing costs. Along with this is an emphasis on providing a variety of peripherals, not only at the initial sale, but also concerning add-ons and product upgrades.

5. Standards

The emerging standards environment for software, networking (TCP/IP and OSI), and peripheral connectivity (SCSI) will allow the turnkey systems VAR to provide a much more complex turnkey solution at a much lower cost of assemblage.

Also, increasing emphasis of VARs on standard hardware and software should allow the VAR to put more emphasis on services and customization and thereby increase the user's perceived value-added portion of the sale.

Emerging standards that should expand the potential market opportunities for VARs include those surrounding UNIX, which is a software operating

system underutilized in the current VAR market. The adoption of the UNIX graphics-based operating systems interface, POSIX (the federal-government-based interface specification for UNIX systems), will create an environment where a VAR-developed UNIX application can be easily migrated from a desktop computer to a mainframe and among multiple-vendor hardware platforms. Standard user interfaces—such as the X Window System Version 11, Open Look from AT&T (also based on X Window), or one that emerges from the OSF consortium of many of the leading UNIX systems vendors—will also improve the often-criticized user interface qualities of UNIX.

The federal government's mandate for the use of OSI protocols with a two to five-year implementation timetable, as specified in the National Bureau of Standard's Government Open Systems Interconnect Profile (GOSIP) report, has been a major factor fostering recent OSI implementation strategies by the major computer systems vendors. This mandate will also require the implementation of transition programs between the current de-facto TCP/IP-based internetwork protocols and OSI.

Overall, the network connectivity market will continue to provide major opportunities for turnkey system VARs of all sizes over the next several years. Programs for providing PC-to-Macintosh translation, as well as other types of multivendor file interchange (with several well-established file format standards) should also provide significant market potential for VARs working with network integration programs. A principal source of competition for VARs in local markets is electrical contractors.

In addition, with the passage of the Computer Security Act of 1987, network security has become a major concern for potential LAN customers. The new law makes the provider of the network service responsible for a customer's loss. This liability provides a potential significant market opportunity for security encryption software and hardware, in particular.

6. Strategic Alliances

Several of the leading computer systems vendors have recently introduced programs that provide more direct vendor sponsorship of a VAR's product. These programs include such arrangements as joint marketing or joint sales calls and product references, as well as incorporation of the VAR or software developer's product in the computer system vendor's own turnkey solutions.

Many resellers of minicomputer products don't take title to the hardware product, which has been a historical characteristic of the value-added reseller channel. Instead, reseller programs of many of the larger minicomputer systems companies involved more of a business partnership relationship, which often includes some degree of joint marketing.

INPUT includes revenues of these programs within the delivery modes of software products and professional services, rather than as part of the value-added reseller market.

IBM, for example, has the Industry Remarketer Program for VARs, which lets IBM sales representatives and IBM remarketers in selected industry application areas participate together in joint sales calls. The program also allows the remarketer to participate in IBM seminars and business shows and to use IBM Product Centers for demonstrations. IBM's strategic alliance program involving independent software developers/VARs also includes its Application Software Division third-party software recruitment program.

IBM's Application Software Division could become a major competitive threat to independent turnkey system VARs in several of the industry-specific markets. It is also possible that IBM could become a major acquirer of independent industry-specific software companies.

Digital Equipment has its Systems Cooperative Marketing Program (SCMP), which provides for credit to DEC's salespeople for leads turned over to SCMP resellers.

Another type of strategic alliance relationship is developing between retailers and LAN VARs: the VARs provides a network integration value-added program.

Another dimension of alliance activity that value-added resellers should explore is possible equity positions by computer systems hardware vendors. IBM's recent minority equity positions in a number of independent software companies that support the IBM platforms, particularly in the mainframe product family, could be a precedent for a longer-term trend of computer systems vendors investing in software products and turnkey systems companies.

The Initial Public Offering (IPO) market to raise capital for VARs will probably continue to be very tight for the next few years. However, as hardware continues to become more of a commodity item and as unit growth slows in hardware shipments, computer systems vendors are going to have to look for ways to capture software revenue in their bookings. Value-added resellers with well-regarded vertical-market software solutions could become popular acquisition targets in the 1990s.

Another type of alliance support that the larger computer systems vendors could provide is financing for VAR leasing programs as well as other types of customer financing alternatives. Greater utilization of Master VAR/distributors could also help smaller value-added resellers more easily handle the financing of inventories.

7. Cooperation between VARs and Consultants

The large accounting firms, in particular, are establishing product and service relationships with established VARs. These relationships can greatly increase marketing potential.

For many years, many consultants have been advisors on information technology, but more recently, companies like Arthur Andersen have become major factors in providing systems integration and turnkey solutions. By using educational outreach programs to inform consultants about products and services, VARs can become a part of the product base such larger professional services/consulting companies use in implementing turnkey solutions.

The type of relationship the various accounting/consulting firms have with VARs varies from firm to firm. Coopers and Lybrand, for example, has a joint-marketing agreement—on a voice-response system for access to employee benefits and other job-related information—with Computer Integration Associates, Inc., an AT&T Master VAR.

Price Waterhouse & Co. has a product approval program for VARs with vertical market software that does not include product recommendation but rather client implementation support.

Hewlett-Packard has a program called the Solutions Partners Program, which will attempt to coordinate sales between its smaller VARs and major consultants that would not normally work with the smaller VARs. The three-way coordinated sales model includes hardware, systems software, and networking from Hewlett-Packard; services such as project management, systems integration, implementation, and training from the consultant; and software from the VAR.

8. PC/Workstation Platforms

The highest growth potential in the equipment platform portion of the turnkey systems market is expected to be in the workstation/PC area. INPUT is forecasting a 20-25% CAGR in workstation/PC hardware platforms over the next five years, compared to 6% for minicomputers and 3% for mainframes. This forecast would suggest that turnkey systems vendors look to the PC/workstation market for porting current and future software solutions.

There is also increasing interest on the part of workstation vendors in pursuing the scientific, engineering, and manufacturing VAR markets, which are among the largest and fastest growing markets for turnkey systems solutions. Leading workstation vendors such as Sun Microsystems and Apollo are seeking to sell the low end of their product lines

through the VAR channel, partly because the lower prices in these products can make the products more profitably sold through such third-party channels.

Office systems/desktop publishing, which is projected to be one of the higher growth segments in the turnkey systems environment over the next several years, should continue to be a strong market for PC/workstation solutions. Other markets that will also show strong growth are the telecommunications, federal government, and process manufacturing segments.

However, a related issue for VARs in the shift from minicomputer to PC/workstation support is that the price of the software application is historically proportional to the price of the supported hardware platform. This proportional relationship will thus reduce the revenues and profit margins per unit sale for VARs making such a hardware transition. Methods for remedying this loss of profits include cross-licensing software from other VARs that support the same systems platform, and expansion into additional support services such as network integration.

The question of which industry desktop operating system software to support as a migration strategy from MS/PC-DOS is another current issue to be addressed by VARs. A number of more-gradual product migration strategies from MS-DOS to OS/2 and/or UNIX have emerged over the past year. Many of these products also address the increasingly complex issue of which graphic user interface de-facto standard to support. Products that could be utilized include: New Wave™ from Hewlett-Packard, DESQview™ from Quarterdesk, Open Desktop™ from The Santa Cruz Operation, Locus Computing Corporation's MS-DOS emulation software, Microsoft Windows, and Digital Equipment Network Application Services' NAS which can provide access to DECnet/VAX/VMS programs.

9. Gray Market Competition

Many universities and colleges have volume purchase arrangements with PC computer vendors such as Apple, IBM, and Zenith. These agreements, when combined with the schools' tax-exempt status, can allow a university to undersell VARs. A few universities apparently do not limit sales to qualified students and staff, but also provide low-priced deals to the more general small-business-computer community.

Another gray market exists between distributors and unauthorized VAR dealers: dumping of excess inventories undermines the pricing policies of the hardware vendor for its different marketing channels. Many VARs that sell gray market products are too small to qualify for authorized VAR status.

One corrective measure taken by some computer systems vendors is the use of authorization numbers. Distributors must use such numbers when dealing with authorized VARs to specify products sold through a two-tier distribution structure.

10. Agents/Brokers

In order to expand marketing coverage with limited financial resources, many smaller to medium-sized VARs are beginning to use agents/brokers to expand geographic market coverage. The agent is usually employed in one of two ways. The agent can act as an extension of the VAR's sales force, often working with the sales and support people of the vendor, to initiate the sale to the end user—but the agent does not take title to the computer system. Second, the agent can provide some enhancement to the VAR's existing product line.

A particular issue related to a VAR's utilization of agents is the confusion to vendors in terms of channel conflicts between VARs and agents. Confusion also exists as to where the responsibility lies for product support.

11. Third-Party Maintenance

A major problem for VARs in trying to expand beyond a regional geographic coverage and into more complex networked products is the cost of providing quality support services for these product extensions.

One approach that appears to be gaining in popularity is to use the third-party maintenance (TPM) companies to provide national support services. This approach is particularly popular in the local-area network (LAN) market for supporting multivendor products. For example, 3Com and Hewlett-Packard recently signed an agreement whereby Hewlett-Packard will help support 3Com's value-added resellers. Support is also provided by Hewlett-Packard and Digital Equipment for Novell products. Increasingly, the major computer systems vendors are expanding their maintenance programs to provide multivendor hardware and software maintenance support. The use of such TPM support also can help a LAN VAR enter the complex wide-area networking market with support/maintenance backup from a larger company with product expertise in this area.

Another related maintenance issue is the potential for conflict over which hardware maintenance problems are covered under the manufacturer's warranty and which become the responsibility of the VAR and the TPM company.

12. Source Code Licensing

A few systems software suppliers to the turnkey systems market—such as Novell, Inc.—are now providing source code versions of their products. The availability of source code provides more software product flexibility for the reseller by enhancing the ability to provide customized applications.

In addition, certain VARs are providing delivery of the source code to customers as part of the total solution. Delivery of source code is a practice of Access International, Inc.—a DEC VAR that provides software solutions for nonprofit organizations. This marketing approach encourages customers to customize the software with help from Access Technology, which provides an add-on revenue source for Access International. Access International software is written with a 4GL data base tool that improves the efficiency of the customization process.

13. Technology Product Trends

Three general software product categories representing maximum new growth opportunities for turnkey systems companies are embedded expert system, integrated imaging processing, and voice recognition/voice response.

In particular, VARs can utilize expert systems application development tools to provide a competitive advantage by adding intelligence to applications. This advantage could be particularly valuable in providing online help prompts for the user in utilizing complex applications. This technology also allows VARs to imbed the intelligence they have acquired in becoming experts in a targeted vertical market. Expert systems technology can also be used to provide embedded solutions for routine diagnostic and other maintenance problems. Natural language processing is another area to explore for providing unique ease-of-use support features.

Increasingly the trend in image processing is to integrate image processing with traditional applications, such as accounting. Certain image processing vendors, such as Laser Data, are providing board-level hardware in addition to systems software tools that can substantially lower the cost of using imaging technology for value-added resellers. In addition, several of the large computer systems vendors are providing software library tools for integrating image-based applications into their network delivery systems.

Voice recognition is another technology that INPUT views as providing high growth opportunities for turnkey systems companies in the 1990s. Integrated Voice Solutions, Inc. is one VAR that currently uses this technology in its hospital automation applications. The technology is

based on the Texas Instruments, Inc. speech recognition product. Also included in the solution is an expert systems/AI capability.

14. Federal Government Turnkey Programs

Turnkey systems will continue to be a part of a variety of applications initiatives of the federal government over the next several years. The heaviest weighting will be for scientific/engineering applications, which is in part the result of a significant number of individual turnkey systems buys planned by the Department of Energy for use in computer-integrated manufacturing (CIM).

Other application areas include data collection, graphics, and personnel systems.

Apparently, agency interest in packaged hardware/software solutions is still very high across a wide spectrum of applications.

15. Application Development Tools

The conflict between VAR customer demand for customized solutions and the expense (and lower margins) for the VAR in providing such product can be addressed through the use of application software development tools such as CASE, 4GL, and RDBMS. In addition, 4GLs today address the need to provide cross-platform application development as well as a strong front-end prototyping tool. The use of RDBMS and related 4GL technology also increases the value of the application as a provider of data for other applications and users within a corporate environment. The use of object-oriented development tools and (eventually) integrated CASE (I-CASE) solutions will also help to significantly reduce software maintenance costs and ease the customization process.

Turnkey systems companies should look increasingly to develop application shells that can be rapidly modified for particular user needs. Shells will be necessary to remain competitive with the larger, more strongly capitalized independent software developers and computer systems vendors.

16. Nontraditional Turnkey Systems Companies

In addition to computer equipment vendors and professional services companies moving into the turnkey systems markets, another newer type of VAR is the IS department or subsidiary of a non-information-services corporation. This department develops a solution for internal use and it then enhances the solution for external sales in related industries. An example is the Fibers department at E.I. du Pont de Nemours & Co. The Fibers department is now selling a turnkey systems product to carpet dealers.

In some cases such VAR solutions can be used to support the parent company's marketing program. An example is a telecommunications package that the John Deere Information Systems subsidiary of Deere & Co. resells to industrial and agricultural equipment dealers.

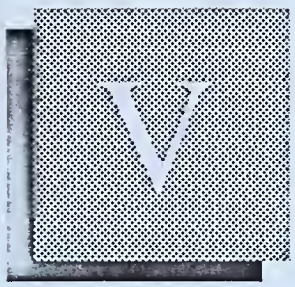
This type of product sponsorship can significantly heighten the level of competition for independent VARs in such markets if the parent company provides deep-pocket financing as well as a captive customer base for its VAR division.

17. Unbundling

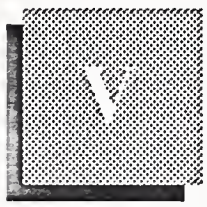
The combined issues of declining hardware margins and variations in vendor discounts among third-party distribution channels are contributing to a continuing unbundling of hardware and software sales by value-added resellers.

Interleaf (which is both a software vendor and value-added reseller), for example, has indicted that future product emphasis will be on software. Recently, overall company profit margins were negatively impacted by turnkey systems product sales.

Other VARs have complained about a trend among their customers to buy unbundled systems: where they buy one VAR's customized software solution and buy the hardware from another VAR, distributor, or vendor. Customers maximize the buying opportunities that result from the gradations in discounting among the various vendor distribution channels.



Value-Added Reseller Survey



Value-Added Reseller Survey

A Introduction

INPUT recently conducted a survey of 31 value-added resellers. The survey examined current product and services offerings, future product and services directions, and observations on leading trends and issues impacting the value-added resellers' market. The complete questionnaire is included in Appendix E of this report. Surveyed companies almost unanimously considered themselves to be turnkey systems companies.

The respondents ranged in size from 4 employees to 1,810—with some of the larger companies being value-added resellers that had been marketing turnkey systems products since the mid-1970s. The median employee count was 32.

The revenue distribution of the respondent companies is presented in Exhibit V-1.

EXHIBIT V-1

Company Revenue Distribution

Revenue Range	Number of Respondents
Under $1 million	3
$1 to $5 million	13
$5 to $10 million	4
$10 to $20 million	4
$20 million+	7

This chapter includes an analysis of the results of the survey.

B

Hardware/Software Platform Support

The following is a summary of survey results on equipment and operating systems supported by the respondents:

- Sixty percent of the respondents indicated support for more than one hardware platform. The most popular individual platform was the IBM PC and IBM PS/2 product families, with 10 of those interviewed providing support for this platform.

- Only one respondent developed a product for a mainframe architecture that included the IBM 370 and 3090 product. In addition that particular company provided support for Hewlett-Packard minicomputers and IBM PCs.

- Fully 17 of the 31 respondents developed their software for minicomputer platforms. Nine of the minicomputer-based companies supported more than one platform vendor. Of the respondents that sold minicomputer-based systems, seven sold Hewlett-Packard, six IBM, and five Digital Equipment midrange computers.

Principal operating systems used are indicated in Exhibit V-2:

EXHIBIT V-2

Operating Systems Supported by Respondents

Operating System	Percent of Respondents
Multiple systems	60
Single	40
UNIX/UNIX-derivative	33
PC/MS-DOS	33
Pick	13
OS/2	3

C

Selection Criteria for Platform Vendor

The survey showed a fairly wide range of determining factors in the turnkey systems company's choice of platform vendor or vendors. Some factors were:

- Level of support service, such as nationwide service support
- Ease of use
- Product flexibility and compatibility
- Vendor's providing an awareness of its future product goals and objectives
- Price/performance of hardware
- Size and credibility of company, including the reputation of the product and the ability to stay on the leading edge of technology
- Multiuser system
- Market share leader in targeted market
- Commitment to independent channels of distribution
- Software compatibility across a wide range of equipment
- Product availability
- Ease of development and maintenance for application software

Support services from the platform vendor—in terms of product maintenance, training, consulting, knowledge of longer-term product direction, and spare parts availability—represented the principal criterion in the selection of a vendor.

Ease of programming—enhanced by strong application tool technology and support for a number of network protocols, which also enhanced the ability to provide multivendor interconnectivity—was also very important as a selection criterion.

The third most important selection factor was the vendor's reputation as a market leader in the particular vertical or cross-industry market targeted by the turnkey systems company.

A trend for future product support appeared to be for cross-platform product development support, which was registered in a plan to provide more UNIX-based products.

D

Important Platform Vendor Support Characteristics

The ability of the platform vendor to provide a number of support services is very important to an interpretation of a high quality supplier. This is also reflected in the wide variety of support characteristics desired of the supplier:

- Quality of service and level of responsiveness—including availability of replacement parts and repair services
- A hardware field service organization
- Installation support for the turnkey company
- Training facilities for the turnkey company's employees
- Help in providing product information to the customers
- Participation in trade shows—cooperative advertising
- Sales leads
- Competitive discounts
- Operating system support
- Consistency in policy
- Joint marketing and selling

Desired additional potential supports identified by the respondents included:

- On-line bulletin boards and data bases or technical sheets for notification of problems/bugs
- Computer-based training
- Price/performance evaluations
- More cooperative programs
- Leasing programs
- Access to technical information and known problem reports
- Better lead management and distribution capability
- Extended warranties

- Advance notices of changes in hardware
- Improvements in interfacing tools
- More cooperative sales effort and a more cohesive working environment within the VAR program
- Better self-study program for operating systems
- A tighter coupling of platform vendor and turnkey scientific and engineering staffs

The most important support features desired of platform vendors, in order of frequency of mention, included: responsiveness to hardware maintenance requirements of turnkey systems customers; more extensive education and training programs for the turnkey system vendor's employees; consistency in handling third-party channel discounts; and joint market activity support.

E

Distribution Channel Conflict

Fifty-two percent of the respondents indicated they experience significant channel conflict with their vendors. The responses to the question on types of channel conflict suggest that this continues to be probably the major issue between platform vendor and and turnkey system vendor. Specific types of conflict mentioned included:

- Different discounts to competitors at the same level
- Question of who owns the customer from the vendor's point of view
- Favoritism among different types of Business Partners
- Putting products in "cut-throat" distribution channels
- Varying discount levels leading to different "street" price level for the same product
- Competition guides with direct sales force not enforced
- Conflict over add-on hardware sales—"ongoing war" over initial add-ons
- Vendor profits coming before customer service—reflected in large inconsistencies in price discounts

The principal current channel conflict issue centered around the variation in volume discounts provided through the multiple third-party distribution channels deployed by many of the larger platform vendors. For the

smaller VARs, this has left many with very slim hardware profit margins. Particular channels which provide the most severe levels of competition include the larger retailers, and VARs who address the education and government markets.

The other principal issue revolves around the ownership of the customer from the platform vendor's point of view. This relates to territorial conflicts of the platform vendor's direct sales organization and the turnkey's sales operations. This issue has been more recently addressed by many platform vendors, principally by crediting their sales representatives for VAR sales in their territories.

A similar issue is the direct competition from many platform vendors who are moving to total solutions selling. Rather than turnkey systems being the principal marketing outlet to the industry-specific (vertical) markets, many platform vendors have begun their own programs to address these markets.

Seventy percent of the respondents felt that little or nothing had been done by their platform vendors to effectively address the issue of channel conflict. Particular attempts by individual platform vendors to remedy the issue included the following:

- Making sales compensation equal to their own sales force no matter who sells the equipment

  - "Told their sales people that if a VAR is in there to move on"
  - "Territory reps are now compensated if there is a VAR in their territory"
  - "No penalty now for not selling if a VAR is there"
  - "It only matters if the product is sold"

- Manipulating price and discount levels in an attempt to reward turnkey companies for productivity

- Regular sales/marketing meetings between platform vendors (at several levels of company personnel) and VARs to discuss target customer base

- "Have realigned programs; forwarded their leads"

F

Value-Added Product Features

Most respondents considered local-area network (LAN) installation capability to be an important element of their value-added product offering. However, the emphasis was more on providing network interfaces than on providing configuration, implementation and network management support.

- Fifty-five percent of the respondents indicated that the principal valued-added dimension of their product was in providing a proprietary application software solution.

- Approximately two-thirds of the respondents emphasized that a customized product strategy was central to their product delivery approach.

- Ten percent indicated a definite move away from a customized product strategy, due primarily to the low profit margins for such a product approach.

- Thirty percent indicated that professional services and systems integration best reflected the primary value-added dimension of their programs.

- Only 10% of the respondents viewed hardware as their principal value-added component.

Eighty-five percent of the respondents were either currently providing or planning interfaces to other software products through cross-licensing agreements. Such product linkages were primarily office automation products, graphics software, data collection and RDBMS products. Lotus, WordPerfect, Oracle and SAS were companies most frequently mentioned.

G

Product Support Provided by Turnkey Systems Vendors

Forty-five percent of the respondents provided 80% or more of their total product support, including both hardware and software maintenance. Thirty-five percent utilized their hardware vendors for all of their hardware maintenance support.

Nearly all respondents provided close to 100% of their own software maintenance. A major issue was how to properly price this service.

An increasing trend appears to be in utilizing more third-party maintenance organizations (such as Sorbus), and distributors or other types of Master VARs for hardware maintenance. TPM organizations can often provide a broader geographical coverage than many smaller, secondary platform vendors.

One issue involved with the use of a Master VAR or other type of distributor for customer maintenance is that it gives them access to the turnkey systems companies' customer bases, which could result in future channel conflict.

H

Marketing Approach

Fifty-five percent of the respondents marketed their solutions solely through a direct sales program.

Other types of marketing approaches mentioned included:

- Product exchanges with other VARs
- Utilization of distributors and dealers
- Joint ventures
- Joint marketing (such as with the larger computer system vendors)
- Use of agents to provide broader geographical coverage

I

Geographical Markets

Seventy-five percent of the respondents marketed their products throughout the continental U.S. Approximately twenty-five percent also distributed their products internationally in addition to a national U.S. coverage. Twenty-five percent had a primarily regional focus.

The high percentage of respondents with a national distribution coverage could reflect the median size of the individual respondent in the survey. At an estimated $2.5 to $3 million in annual revenues, this is representative of the industry.

Thirty percent of the respondents indicated they expected to provide international marketing coverage in the near term. Of that group, fifty-five percent indicated they would be expanding into the European market, and the remainder were focusing more on Australia and the Pacific Rim.

These markets were perceived as less mature markets than those in the continental U.S.

J

Product Expansion Plans

Exhibit V-3 summarizes the principal product expansion plans cited by the respondents.

Other product expansion programs mentioned included: systems integration, including systems operation; more emphasis on maintenance service contracts; support for EDI and SQL interfaces; additional micro-to-mainframe linkages, for external data base access; and expansion into wide-area network application services.

One particular hardware platform migration direction evident in the results was an anticipated move to a RISC-based computer system. The one hardware peripheral several respondents indicated they intend to support in the future is CD ROM/optical disk technology.

EXHIBIT V-3

Product Expansion Plans

Product/Service Category	Percent of Respondents
Additional applications for vertical market niche	90
Professional services (education and training, and consulting)	75
UNIX/UNIX-derivative	40
International expansion	30
Cross-product VAR exchanges	30
Additional hardware add-ons	25

Approximately 30% of the respondents utilized a 4GL for product development. A trend to a greater level of 4GL usage was not in evidence. There appeared to be little current interest in CASE.

Nearly all respondents indicated they were interested in industry standards. The highest level of current support was for industry-specific standards. Most look to their vendors to provide such support. The most frequently mentioned standard was UNIX. Fifteen percent of the respondents mentioned SAA/OS/2 as a future standard they would support.

K

VAR Market Issues

The following issues were emphasized as impacting the success of a turnkey systems value-added reseller program:

- Hardware margins disappearing—becoming a commodity market
- Difficulty of recruiting and retaining qualified sales and technical people
- Trend to total solutions (providing increased levels of competition) by computer systems vendors, retailers and some independent software vendors

- Limited capital resources
- Weakness in marketing programs—lack of knowledge of what is necessary to reach desired markets

L

Successful Turnkey Systems Strategies

The key factor for a successful strategy emphasized by nearly all the respondents was the ability to provide a lot of added value through the support systems. They perceived that a principal reason for customers working with them was to be able to obtain a total solution and support package. This included customized product solutions, with the ability to modify existing software packages; good servicing people; familiarity with the individual needs of an account; and the ability to provide a personalized service capability, including individually tailored training programs. The ability to take responsibility for the total solution was also considered an important element of the support function. In essence, the ability to convey oneself as an expert in one's particular market niche is essential.

Other product/service factors mentioned for a successful strategy included:

- A product that is well-tested before initial delivery
- Becoming an expert in a particular market niche
- Increasing price sensitivity of the customers—avoiding the discounting trap to obtain business
- Providing UNIX support for future products to allow for multiplatform utilization
- Emphasizing sales and service as part of a total quality service organization
- Providing hardware and systems software products with "brand" recognition

M

Profitability and Revenue Growth

A summary of the distribution of profitability of the respondents, measured by their current pretax margin, is included in Exhibit V-4.

The average revenue growth rate of the thirty-one respondents in 1987-1988 (weighted by size of company) was approximately 25%. Many of these companies are relatively young companies (with small revenue bases) which affects conclusions drawn about general industry growth rates from this sample. However, this is in line with the overall growth rate for the software products industry for the same time period.

EXHIBIT V-4

Distribution of Profitability

Pretax Margins	Percent of Respondents
over 20%	20
10-20%	45
under 10%	30
unprofitable	5

N

Competition

The principal types of competition mentioned by the respondents are contained in Exhibit V-5. Most of the respondents mentioned only one type of principal competitor.

EXHIBIT V-5

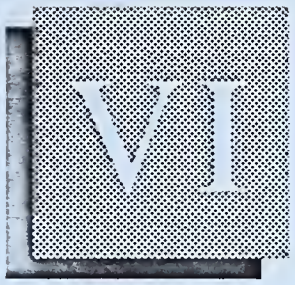
Principal Competition

Category	Percent of Respondents
Computer Systems Companies	25
Dealers/Distributors	20
Other VARs	20
None	20
Independent Software Developers	15
In-house IS Departments	10
Systems Integrators	5

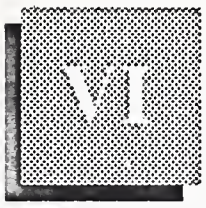
Approximately half of the respondents perceived no significant change in the competitive environment within the past year.

Specific changes in competition mentioned were:

- IBM's endorsement of certain competing software products
- The trend to commodity pricing of hardware—with increasing competition from high-volume distributors
- The trend to total solutions marketing by computer systems vendors and some systems software vendors
- Systems integration companies remarketing a customized solution developed for a particular client
- Retailers becoming more competitive with value-added resellers as the number of applications available from the retailers increases
- RBOCs showing increased interest in solutions selling; also AT&T starting to "bundle" hardware and software into solutions



Competitive Environment



Competitive Environment

A Competitive Structure

The turnkey systems market today consists of:

- Larger traditional turnkey system vendors such as HBO & Co. and Reynolds & Reynolds
- The larger distributors/Master VARs
- Small- to medium-sized VARs, the majority of which have revenues of under $3 million
- Value-added retailers (computer stores)
- Computer systems vendors

In addition, the market is increasingly attracting professional services vendors and systems integrators. The more recent entrance into the turnkey systems market by computer systems vendors, value-added retailers, professional services vendors, and systems integrators has greatly heightened the level of competition and contributed in part to the narrow profit margins in this market as compared to other information services distribution markets.

There are several well-defined applications (e.g., CAD/CAM/CAE, automobile dealer systems, hospital accounting systems, etc.) that have had major success, and have allowed several turnkey systems vendors to grow to significant size.

The top twelve turnkey systems vendors (based on 1988 revenues) comprise 29% of the industry total. (See Exhibit VI-1.) The ability to seize market niches and grow with them has enabled these vendors to develop strong positions.

EXHIBIT VI-1

12 Leading Vendors' U.S. Turnkey Systems Revenues, 1988

Company Name	1988 Revenue ($ Millions)	Market Share (Percent)
Prime Computer	600	6
Intergraph	350	3
Gerber Scientific	288	3
ADP	250	2
Compugraphic	230	2
McDonnell Douglas	220	2
HBO and Co.	187	2
Mentor Graphics	187	2
Reynolds & Reynolds	182	2
Computer Consoles	176	2
ISC Systems	166	2
Bolt, Beranek and Newman	137	1
Total		29

1. Some revenue figures represent INPUT estimates
2. Market definition does not include embedded control systems company revenues

Detailed descriptions of some of the leading turnkey systems vendors are found in the next section of this report.

VARs have become an important part of the distribution channel strategy of most emerging companies; VARs are an alternative to the direct sales force approach. VARs have easier access and less overhead in selling in

specific geographical areas or in specialized application niches, and have been very effective in moving products in the minicomputer and microcomputer markets. The smaller VARs generally are not effective in selling large and/or expensive turnkey application systems. End users with large systems requirements are generally more comfortable dealing directly with the manufacturers.

The small- to medium-sized VARs tend to have a local or regional focus, although many such dealers are now extending their marketing reach through the use of agents/brokers.

B

Successful Turnkey Systems Supplier Strategies

There are many other types of turnkey systems suppliers in addition to computer systems companies. In particular, the types of turnkey systems company suppliers now expanding beyond PC/workstation, minicomputer and mainframe systems vendors include a number of systems and applications software companies.

INPUT believes that the independent software companies will become an increasingly important supplier group for turnkey systems companies and an important source of products for maintaining and enhancing turnkey systems companies revenue growth. In addition, many small- to medium-sized software suppliers, with complex product offerings, can maximize their marketing efficiencies by emphasizing third-party marketing channels.

A few of the more successful turnkey systems suppliers identified by INPUT include:

- Autodesk, a leader in PC/workstation CAD software
- Seagate Technology, the largest manufacturer of small-format Winchester disk drives (distributors and VARs represents its largest distribution channel)
- Hewlett-Packard, with its highly responsive support program for its third-party distributors
- WordPerfect, with its highly successful word processing application
- Neuron Data, with NEXPERT OBJECT, a leading knowledge-based application development system
- Novell, Inc., with its "de facto" LAN operating system standard
- Oracle, Sybase, Ingres, and Informix, leading providers of network-based multiuser distributed relational data base software development products

Brief summaries of some of these turnkey systems company supplier approaches to dealing with the VAR distribution channel are outlined below:

1. Autodesk Corp. (Sausalito, CA)

Autodesk's leading product, AutoCAD, for PC/workstations, is sold only through its reseller distribution channel. Certain of the smaller revenue products are also sold through telemarketing and retailer channels.

Their major account group, however, channels all sales through the Autodesk VAR/dealer network. At present, this network includes approximately 1200 qualified VARs/dealers.

Requirements for its VARs/dealers include an engineering or other technical background which matches the targeted markets for AutoCAD, and Autodesk requires at least one week of initial product training.

All VARs/dealers receive the same discount.

Autodesk minimizes the difficulty of writing enhancements or customizing AutoCAD by making it an open architecture and by providing development tools, including interfaces to various peripheral products.

The AutoCAD and other Autodesk software products are bundled by the VAR/dealer with hardware, training, and support services.

A major and unique product support feature for Autodesk VARs/dealers is the company's network of several hundred third-party software developers who integrate AutoCAD into applications for various vertical and cross-industry markets. These products are frequently made available to the Autodesk VARs/dealers on a licensing basis. This greatly increases the quantity of products available for the Autodesk VAR/dealer channel, with the cost of development amortized over a much larger potential customer base than that of the individual VAR/dealer.

AutoCAD has been adopted by several educational and government agencies as a recommended solution. This has created large potential markets for Autodesk products. However, the sales opportunities remain with the VAR/dealer.

2. WordPerfect Corporation (Orem, Utah)

WordPerfect is a leading developer of word processing software for PC/workstations, minicomputers and mainframes from a wide range of computer equipment vendors. These products are available in many different languages.

One of WordPerfect's product offerings, WordPerfect Library, facilitates enhancing and customizing WordPerfect word processing-based applications. It is a program manager "shell" package that allows the user to integrate several programs, switch programs rapidly, and share data among applications. The shell menu is predefined to include all of WordPerfect Corporation's products and can be customized to include only specific products and functions. Twenty programs can be organized and displayed with an unlimited number of submenus—one for games, one for tutorials, one for utilities, etc. The library shell also supports non-shell aware programs such as Lotus 1-2-3 and dBase II. Keyboard macros which encompass all of the products in the shell menu are also available to help streamline keyboard entry. Macro definitions may include program entry and exit, screen copy, execute clipboard, and any software-specific function keys.

Another software product provided for VARs is a file format developer toolkit which provides access to the word processing text in other applications.

WordPerfect views resellers as its most important distribution channel. Its resellers are in two principal groups: resellers and consultants. A reseller takes ownership of the software and usually provides some added value. A consultant's principal revenue source is a consulting fee.

The company sells directly to ten large distributors who, because of their higher volume purchases, receive a larger discount than the individual VAR. Larger retailers can also qualify as such distributors. The distributor then resells to the smaller VARs. Principal benefits of this arrangement for the individual VAR are that it is a single source of a number of software packages and that it provides a form of inventory financing for the smaller company. The market ultimately determines the final price of the WordPerfect word processing applications.

The company has approximately 90 marketing managers (with regional jurisdictions) whose primary functions are to provide resellers with new product information; to train VAR managers and their sales people to sell WordPerfect; and to work in conjunction with resellers on large accounts. There is no competition with a direct sales force for such accounts.

WordPerfect also provides a free demonstration copy of the WordPerfect word processing software for VARs with demonstration facilities. If VARs do not have a demonstration area, they can obtain a copy at a discounted price of $40.00 to learn the program.

A dedicated 800 number telephone hotline service is provided to the top VARs, which gives personalized technical support. The average waiting time for this service is six seconds. For other VARs and their customers, an 800 hotline service is provided with an average wait time of 45 seconds. This is staffed by 450 support people.

The company also provides a regular newsletter for VARs which includes educational product material.

3. Neuron Data, Inc. (Palo Alto, CA)

Neuron Data's NEXPERT OBJECT is a leading expert system development tool. The product has been ported across all principal PC/workstation platforms, to the VAX and, most recently, IBM mainframes running the MVS and VM operating systems. NEXPERT OBJECT also provides transparent access to data bases and integration with standard programming languages. NEXPERT OBJECT is also SAA (system application architecture)-compliant.

Neuron Data's Nexpert Partners Program (for value-added resellers) is considered the linchpin for its overall marketing strategy for NEXPERT OBJECT.

NEXPERT can be delivered in either standard or client/server architectures. The client/server architecture, the NEXPERT AI Server™, which consists of the AI Library plus a server for communications processing, runs separately from the client applications, which consist of the end user interface (or program) and the client library. The AI Server expands NEXPERT's capabilities to include transaction and cooperative processing environments. With its cooperative processing support, the NEXPERT client/server architecture allows NEXPERT client applications on IBM PCs running DOS or OS/2, or IBM RTs running UNIX, to access the AI server and data running on a number of other data base server platforms. In addition, with NEXPERT's client/server architecture, and support for the HLLAPI communication protocol, graphical applications such as Excel, Guide and SQL Windows running under Presentation Manager or Windows can communicate with a mainframe knowledge base using standard 3270 communications technology.

NEXPERT supports seamless integration to DB2 and SQL/DS via the NEXPERT data base bridge. SQL queries can be specified in rules and objects, or can be built with full support for dynamic SQL.

NEXPERT OBJECT was developed as a completely open architecture with unique callable interfaces, which allows for the embedding of rule-based intelligence into a large solution written in C or other programming languages.

The NEXPERT development version provides tools to build artificial intelligence (AI) applications. The delivered applications consist of a knowledge base (rules and objects defined by the user), AI Library (or inference engine), and end-user interface.

NEXPERT OBJECT is used by three types of resellers to provide varying levels of product integration:

- Companies which provide software bridges to other SQL data bases
- VARs who build products with NEXPERT OBJECT—i.e., real-time intelligence network management systems
- Companies which imbed intelligence into their standard solutions—i.e., an ATM network

Neuron Data has two levels of VARs: NEXPERT developers and full partners. The developers qualify for an estimated 30% discount and provide extensive consulting support.

Partners are considered product experts and are certified and included in a company reference category. They are also included in trade shows and other specialty marketing programs. They are entitled to a higher level of discounting than are the dealers.

4. Sybase, Inc. (Emeryville, CA)

Value-added resellers have been a principal distribution channel for the SYBASE SQL Server™ for distributed data base processing, which is part of a joint development and marketing program involving Sybase, Microsoft, and Ashton-Tate.

The SYBASE systems provides support for the UNIX, OS/2, VMS, and Macintosh operating system environments. In addition, support for the company's OPEN SERVER architecture allows for server-to-server data access and update across multiple vendor data base platforms.

Sybase and SmartStart Corp. also recently announced a joint marketing and technology agreement under the Sybase Synergy alliance program, on an interface which will enable customers to build SYBASE® applications with SmartStar 4GL application development tools. SmartStar is a leading vendor of Digital-based 4GL application development software. This extends the value of the SYBASE system in connection with Digital products by allowing customers to access VAX Information Architecture products, including ALL-IN-1, Datatrieve, and CDD/Plus, Digital's distributed data repository. The SmartStar/SYBASE connection also will enable SYBASE customers to utilize SmartStar's SQL-based Relational Query Processor (RQP) to prototype and run applications under RMS (record management system), the VAX standard file structure. This will also enable SmartStar developers to move their RMS applications to SYBASE with minimal changes.

Sybase is in the processing of enhancing its VAR program. It is looking for premier VARs who are market leaders in both smaller niche markets and larger vertical or cross-industry markets. The thrust of the program will be to increase their potential for success as a Sybase business partner, by providing maximum product and support services and by focusing on reducing territorial conflicts among VARs. The vendor and the VAR will cooperate to gain new business. Other elements will include flexibility in product and pricing to accommodate the needs of a variety of VARs, and attractive discounts to improve VAR margins. The recent merge with SQL Solutions of Burlington, MA, will enhance Sybase's professional services support capability for the value-added resellers.

Sybase is focusing on several vertical markets, including manufacturing, financing services, telecommunications, and the government, for applications which utilize on-line distributed processing.

5. Novell, Inc. (Provo, Utah)

Novell, with its Netware Local-Area Networking operating system software, and gateway solutions to wide-area networks, has three principal marketing programs for its resellers. Other distribution channels include retailers and distributors.

The company's three reseller channels include:

- The Portable Netware product, a source code version of its native Netware LAN operating system, which is provided for both hardware and software turnkey systems resellers. Such companies often private label the Netware product and development network applications, usually as part of a vertical or cross-industry solution.

  The provision of the software source code is unique in its industry. Also included as part of the product support is a twenty-four hour hotline and a Portable Netware Engineering group which provides technical knowledge support for the turnkey systems design group.

  In addition, Novell's service organization provides various types of multilevel product support for both the turnkey systems company and its customer base.

  Third-party maintenance support is also available for wide-area networking product support from such companies as Hewlett-Packard and Xerox, with whom Novell is developing such relationships.

- Novell's second reseller channel includes hardware systems vendors who purchase the native Netware operating system, bundle it with their

hardware system, and provide added value with additional software utilities. The Netware may or may not be privately labelled.

- The company's third reseller channel is with system integrators.

Novell also has a National Accounts Program for addressing the LAN and WAN needs of the Fortune 2000 companies. The members of this staff do not sell, but instead support the corporate marketing effort of the company's resellers.

Since Novell does not have its own direct sales organization, marketing conflict of interest with the company is not an issue. In addition, recent programs to bring retail discounts in line with those of the reseller channel, and the increasing use of Master VARs for distribution to smaller VARs, have helped address possible channel conflicts within these distribution categories.

Novell, like many other turnkey systems suppliers, has become increasingly selective in signing on new turnkey systems companies. In particular, it is looking for turnkey systems companies that can help grow the market by providing incremental sales. This, too, helps to address the potential issue of channel conflict.

In addition to the products of the suppliers just mentioned, turnkey systems companies should also look to software product suppliers for leading-edge application software product and application development tool technologies. Selected examples of suppliers of such products include:

- Unify, with its ACCELL fourth generation language development systems that provide for cross-platform RDBMS-based application development

- Odesta, a leader in products which enhance the office and application development environment for Apple Macintosh computers and Macintosh DEC connectivity

6. Unify Corporation (Sacramento, CA)

Unify is a vendor of the cross-platform 4GL development system, ACCELL. It also provides its own UNIFY RDBMS.

The original focus of the company was on the UNIX market, where ACCELL is a leader in the UNIX-based application development software tools market.

The ACCELL product has an integrated two-level application development capability, for report generation and advanced program develop-

ment. Eighty to ninety percent of many applications can be accomplished with the ACCELL system. Its query by form interface maximizes ease of use. It also provides hooks into third generation language development environments.

Principal benefits of ACCELL to a VAR include: the ability to easily move an ACCELL-developed application to all other major DBMS environments (including support for many different variations of SQL); integrated data access across data base platforms for an ACCELL application which supports the Netwise and Sun Microsystems Remote procedure call; rapid prototyping of applications for potential customers; and built-in application development support for the leading "de facto" graphics user interfaces. The Santa Cruz Operation is also an ACCELL partner.

In addition, overall programming development time can be considerably reduced with ACCELL product features such as program by exception and a number of built-in subroutines, including the graphic user interface development system.

The company has a particularly strong marketing presence in the federal government, financial services, and manufacturing and distribution markets for on-line transaction processing applications.

In the fall of 1989, Unify announced a program intended to expand its VAR channel. Called the "VAR Sales Accelerator" the program offers UNIX software developers and resellers comprehensive support in sales and marketing, business planning, and technical consulting. In addition, the ACCELL 4GL development system is offered to VARs at an 80% discount.

Other support services include: access to corporate advertising programs (including newsletter coverage as well as other special promotional and product demonstration materials); special assistance in gaining exposure at trade shows and with other special UNIX customer groups; and a VAR Sales Accelerator manual, including timely updates on Unify product releases, new versions and general market research on the UNIX marketplace.

Due to the sophistication of Unify's product, distribution through retail channels does not pose a channel conflict problem for Unify's VARs. Other third-party distribution channels include OEMs and systems integrators.

7. Odesta Corporation (Northbrook, IL)

Odesta Corporation develops and markets a range of software products used for information management, access, and analysis in standalone and networked Macintosh and DEC VAX environments. Odesta is an original Macintosh developer for Apple Computer and the first Macintosh developer to join with DEC in a cooperative marketing alliance. Odesta's first product was Helix®, a data base product for the Apple Macintosh. The company has extended the Helix technology from a standalone data base to a networked client/server data base development environment. The Helix technology also forms the basis for other Odesta products.

Odesta has sold over 75,000 copies of its software products to individuals and organizations worldwide.

The company's product available to VARs is the Odesta Document Management System™ (ODMS). Shipped initially in December 1988, ODMS is the first family of workflow and document management applications for heterogeneous computing environments. With ODMS, users can store, share and retrieve any type of document. Workgroups and managers can automatically track the status, deadlines, projects, and people involved with document creation and production.

ODMS runs in a client/server environment of Macintosh hosts/servers, VT terminals and Macintosh clients. It supports all VAX and Macintosh documents and files as well as PC document management via VMS services for MS-DOS. ODMS also supports DEC's compound document architecture (CDA) and network applications support.

The company's icon-based, object-oriented interface is combined with development tools for VARs to create customized look and feel user interfaces.

Odesta works with VARs and systems integrators who have some level of expertise in a particular industry-specific (vertical) market.

The document retrieval capability supports many different query/retrieval types. ODMS creates the rules for integrating a document management master into applications for document generation (such as in the legal or aerospace industries), for publishing or procurement requirements.

In particular, it can also be used for integrating document retrieval and workflow distribution into an image processing-based solution.

8. Ingres Corp. Alameda, CA (formerly Relational Technology)

Ingres provides a distributed RDBMS/application development tool product which spans a broad range of computer hardware and operating systems. The company's particular historical product emphasis has been in the VMS and UNIX operating system environments.

Ingres also provides gateways to the other leading RDBMS platforms, including products from IBM, DEC, Oracle, etc. This helps minimize the programming effort needed to provide Ingres-developed applications with access to data from multivendor data base systems.

Ingres' relational data base product is also included as part of the Santa Cruz Operation's open desktop development toolkit for VARs in the UNIX-based PC/workstation environment.

Other recent product announcements from Ingres include its "state-of-the-art" Intelligent Client/Server architecture, which is a rules-based system that provides for referential integrity of the data base architecture and support for business management rules across applications.

Particular support services for VARs include consulting, sales and technical training, and direct maintenance contracts (on an individual case basis). The Ingres consulting service to VARs leverages the industry expertise of the VAR, and is not designed to compete with the VAR's own consulting program offering.

Key characteristics of successful turnkey systems suppliers are included in Exhibit VI-2.

Vendors should also look to creating product supply relationships with systems integrators as an extension of their value-added reseller distribution program. INPUT projects that the systems integration delivery mode will show a 24% CAGR over the next five years, the highest of any delivery mode sector of the information services industry. However, it also has the potential for creating another type of channel conflict with the vendor's VAR program, so separate products might be included for the two different distribution channels.

EXHIBIT VI-2

Characteristics of Successful Turnkey Systems Supplier Products and Services

- High-quality, reliable product
- Product availability with timely competitive upgrades
- Broad product offering for targeted industry, including a network-based computer offering
- Open systems architecture
- Responsive maintenance program
- Cooperative advertising program
- Minimal direct sales, third-party channel conflict
- Ease of integration with other product offerings
- Comprehensive software development tool libraries
- Support for industry standards
- Portable software
- Product migration path
- Available inventory/receivables financing
- Education programs both on the vendor product and small business management
- Merchandising support programs for VARs—including trade shows, joint advertising, seminars, and direct mail and telemarketing support
- Timely awareness and implementation of new product information

C

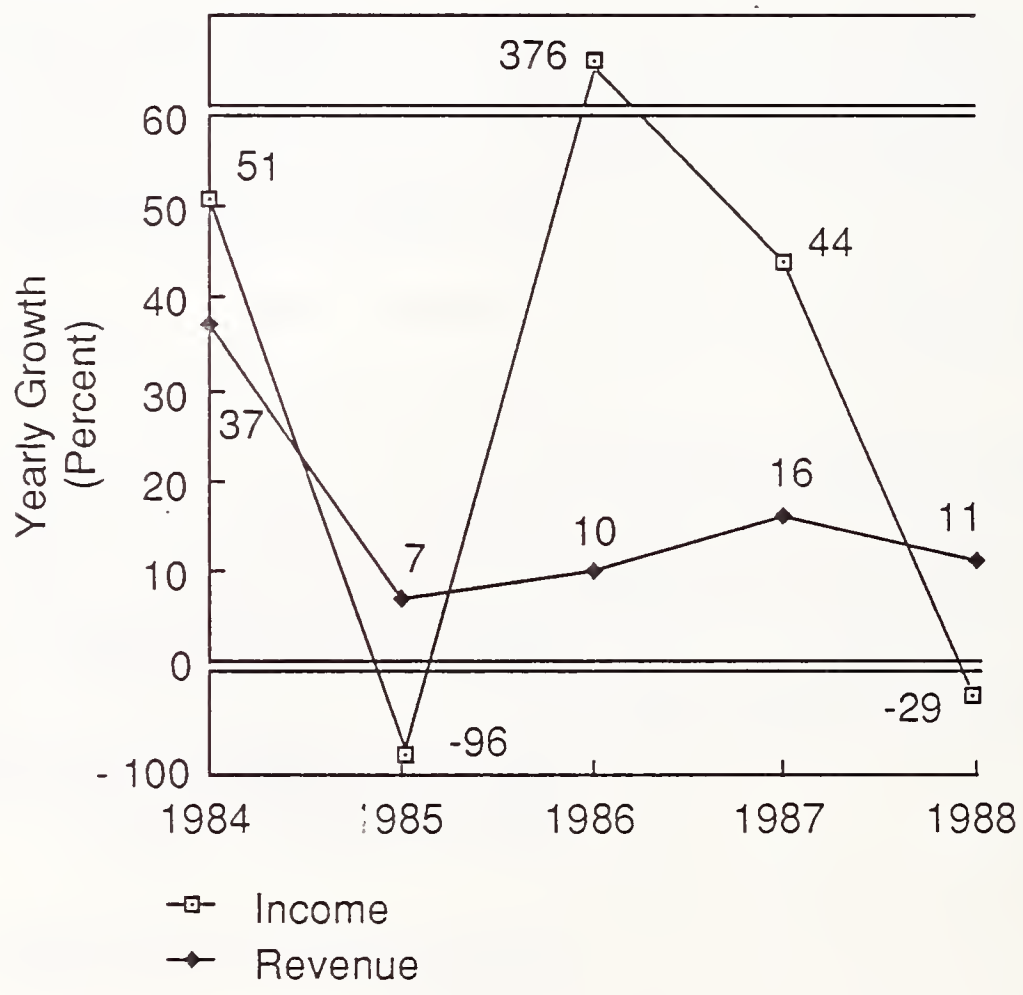
Public Turnkey Systems Companies Comparative Performance

INPUT's index of twenty public turnkey systems companies, which includes companies with 1988 fiscal year-end revenues from $3.2 million to $800 million, showed an 11% annual revenue expansion, with annual net income growth declining 29%. Revenue growth in 1987 was 16%, with net income increasing 44%. The annual rates of change in net income in the turnkey systems market have been very erratic. During 1985, the group's earnings fell significantly each quarter from the year-earlier period. Since then, earnings improved every quarter, sometimes dramatically, until the fourth quarter of 1988. During the fourth quarter, earnings fell 125% from the prior year, which included the impact of a $66 million loss incurred by Daisy Systems.

As shown in Exhibit VI-3, growth for public turnkey systems company vendors in INPUT's sample has been moderate to low during most of the past five years. Revenue growth for the industry group peaked in 1983 and 1984.

EXHIBIT VI-3

Public Turnkey Systems Companies' Revenue and Income Growth



The most significant contributors to the growth of the publicly traded group of turnkey systems company companies in 1988 were ASK Computer Systems, Computer Consoles, Daisy Systems, Intergraph, Interleaf,

and Reynolds and Reynolds. These companies are some of the largest turnkey systems company suppliers.

A summary of the 1988 revenue and income growth of the public turnkey systems companies tracked by INPUT is included in Exhibit IV-4.

EXHIBIT VI-4a

Public Turnkey Systems Companies' Revenue and Earnings Performance

Company Name	Fiscal Year-End	1988 Total Revenue ($ Millions)	Growth 1988/1987 Percent (+/-)
ASK Comp. Systems	30 Jun.	168.3	45
Auto-Trol Tech.	31 Dec.	74.3	-2
Avant-Garde	30 Apr.	11.5	-34
Barrister Info.	31 Mar.	33.5	-11
C3	31 Mar.	66.7	-39
Cerner	31 Dec.	40.6	21
Comptek Research	31 Mar.	50.9	17
Computer Consoles	31 Dec.	175.9	19
Computrac	31 Jan.	12.3	66
Daisy Systems	30 Sep.	121.4	17
Gerber Scientific	30 Apr.	288.4	13
HBO & Company	3 1Dec.	187.4	7
Intergraph	31 Dec.	800.2	25
Interleaf	31 Mar.	74.9	44
ISC Systems	30 Jun.	162.8	-9
Libra Systems	31 Oct.	3.2	-4
Penta Systems	31 Dec.	17.2	-22
Reynolds & Reynolds	30 Sep.	605.4	6
Tenera	31 Dec.	31.9	-12
Triad Systems	30 Sep.	128.0	10
Total		3,054.9	11

EXHIBIT VI-4b

Public Turnkey Systems Companies' Revenue and Earnings Performance

Company Name	Fiscal Year-End	1988 Total Net Income ($ Millions)	Growth 1988/1987 Percent (+/-)
ASK Comp. Systems	30 Jun.	12.2	46
Auto-Trol Tech.	31 Dec.	-0.2	-110
Avant-Garde	30 Apr.	-6.6	-49
Barrister Info.	31 Mar.	-4.6	-394
C3	31 Mar.	2.9	-80
Cerner	31 Dec.	3.5	-13
Comptek Research	31 Mar.	0.4	-72
Computer Consoles	31 Dec.	6.0	-47
Computrac	31 Jan.	1.9	552
Daisy Systems	30 Sep.	-61.7	-342
Gerber Scientific	30 Apr.	31.7	13
HBO & Company	3 1Dec.	12.5	-6
Intergraph	31 Dec.	88.0	26
Interleaf	31 Mar.	2.7	-48
ISC Systems	30 Jun.	4.5	-44
Libra Systems	31 Oct.	-0.6	-20
Penta Systems	31 Dec.	-3.1	-120
Reynolds & Reynolds	30 Sep.	22.4	15
Tenera	31 Dec.	6.0	-33
Triad Systems	30 Sep.	12.2	76
Total		130.1	-29

D

Turnkey Systems Companies Strategic Models

The following is a limited sample of turnkey systems companies which have demonstrated a variety of product/service strategies.

1. ASK Computer Systems
2. Auto-trol Technology Corporation
3. Barrister Information Systems Corporation
4. Bluebird Systems, Inc.
5. Deere Tech Services
6. Delphi Information Systems, Inc.
7. Gerber Scientific, Inc.
8. HBO & Company
9. Intergraph Corporation
10. Mentor Graphics Corporation
11. Reynolds and Reynolds Company
12. Speech Plus, Inc.
13. Triad Systems Corporation
14. Votan

ASK COMPUTER SYSTEMS, INC.
2240 W. El Camino Real
P.O. Box 7640
Mountain View, CA 94039-7640
(415) 969-4442

Ronald Braniff, President and CEO
Public Corporation, NASDAQ
Total Employees: 801 (9/89)
Total Revenue, Fiscal Year End
6/30/89: $186,293,000

The Company

ASK Computer Systems, incorporated in 1974, develops, markets, and supports the MANMAN[R] Information System, an integrated management information system for the manufacturing industry. MANMAN is available as a turnkey system, through the company's ASKNET remote processing service, or as a software product.

- On September 21, 1989, ASK acquired Data 3 Systems, Inc. of Santa Rosa (CA) for approximately $19 million in cash. The acquisition was accounted for as a purchase.

  - Data 3 Systems, a privately held company, develops and markets integrated manufacturing software systems and support services for IBM AS/400 and System 38 computers.

  - Data 3 Systems has over 500 customer sites worldwide. The company had 115 employees at the time of the acquisition and revenue of over $16 million for the fiscal year ending June 30, 1989.

  - Data 3 Systems now operates from its offices in Santa Rosa as an independent division of ASK.

- As a result of the acquisition of NCA Corporation of Santa Clara (CA) in August 1987, ASK continues to enhance and support the MAXCIM[TM] line of manufacturing/financial planning and control applications for DEC VAX systems.

ASK's fiscal 1989 revenue reached $186.3 million, a 31% increase over fiscal 1988 revenue of $142.4 million. Net income rose 25%, from $10.8 million in fiscal 1988, to $13.5 million in fiscal 1989. In the five-year summary that follows, financials do not include Data 3 Systems, which was acquired subsequent to the end of fiscal 1989:

ASK COMPUTER SYSTEMS, INC.
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	6/89	6/88	6/87	6/86	6/85
Revenue	$186,293	$142,414	$98,305	$76,019	$79,233
• Percent increase (decrease) from previous year	31%	45%	29%	(4%)	22%
Income before taxes	$21,047	$15,422	$12,534	$9,816	$14,709
• Percent increase (decrease) from previous year	36%	23%	28%	(33%)	35%
Net income	$13,490	$10,795	$8,001	$5,889	$7,949
• Percent increase (decrease) from previous year	25%	35%	36%	(26%)	29%
Earnings per share	$1.00	$0.82	$0.62	$0.46	$0.65
• Percent increase (decrease) from previous year	22%	32%	35%	(29%)	23%

ASK management attributes increases in revenue and net income primarily to a higher volume of sales and service domestically. Growth also reflects additional product offerings, expansion in international markets, and the fiscal 1988 acquisition of NCA.

Product development expenditures were approximately $13.4 million (7% of revenue) in fiscal 1989, $11.9 million (8% of revenue) in fiscal 1988, and $8.3 million (8% of revenue) in fiscal 1987. Additional capitalized software development costs were $869,000 in fiscal 1989, $1.3 million in fiscal 1988, and $777,000 in fiscal 1987.

Revenue for the three months ending September 30, 1989 was $38 million, a 3% decrease from $39.3 million for the same period in 1988. Net income for the period was $552,000, a 77% decrease from $2.4 million for the same period a year ago.

- The company experienced a generally lower level of demand in its market and some delays in customer approvals during the quarter. ASK management attributes the results principally to a lower level of capital spending in the manufacturing sectors of the U.S. economy.

- Lower income reflects the combined effects of lower than anticipated revenue with comparatively larger operating expenses. Selling, general, and administrative expenses were $15 million, compared to $13.2 million for the same period a year ago. The increase is due mainly to international expansion, growth in field sales and services organizations, general increases in salaries, and costs associated with a new advertising campaign.

As of August 31, 1989, ASK had 801 full-time employees, segmented as follows:

Marketing, sales, education, and field support	478
Product development	193
ASKNET operations	20
Finance and administration	110
	801

The company currently has over 915 employees (including 115 Data 3 Systems employees).

ASK competes with IBM, Hewlett-Packard (HP), and Management Science America (Dun & Bradstreet) in the software product/turnkey system market. In the processing services area, the primary competitor is Xerox Computer Services.

Key Products and Services

A three-year summary of ASK's source of revenue follows:

ASK COMPUTER SYSTEMS, INC.
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	6/89		6/88		6/87	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
Turnkey systems and software	$144.8	78%	$108.3	76%	$77.5	79%
Warranty-Plus	22.4	12%	18.5	13%	9.8	10%
Processing, education, systems integration, and implementation	19.1	10%	15.6	11%	11.0	11%
TOTAL	$186.3	100%	$142.4	100%	$98.3	100%

ASK provides its management information systems to discrete and process manufacturing companies. The systems are available on a turnkey basis, as software products, or via the ASKNET processing service. There are currently over 3,000 ASK customer sites worldwide.

- ASK systems operate on HP, DEC, and IBM midrange computers.
- ASK provides its software products under a perpetual fully-paid license agreement to be used on a specific serial numbered computer.
- All computer hardware installation, maintenance, repair, and operating system software updates for ASK turnkey clients are provided by the hardware vendor. ASK is responsible only for the installation and maintenance of its software products.

ASK's primary offering is the MANMAN Information System, an on-line, interactive system that consists of integrated products for manufacturing, finance, marketing, customer service, decision support, and computer-integrated manufacturing functions. MANMAN is available to clients as a turnkey system, software only, or as a processing service.

- MANMAN is targeted to manufacturers in the batch production, JIT/repetitive, automotive, job shop, and batch process manufacturing segments.

- MANMAN runs on HP 3000 and Precision Architecture 900 series computers and DEC VAX series minicomputers.

- There are currently over 1,800 MANMAN clients worldwide.

MANMAN products are integrated by a common data base. Each product can be used independently or integrated with one or more MANMAN products. MANMAN currently consists of the following products:

Manufacturing:

- MANMAN/MFG™ is designed to manage all aspects of manufacturing planning and execution, including inventory control, bill of materials/engineering design, work-in-progress/shop floor control, purchasing, material requirements planning, capacity requirements planning, master production scheduling, and cost accounting.

- PLANMAN®/MFG is a forecasting and budgeting product that links minicomputer-based manufacturing data to microcomputers for sales analysis and forecasting, and provides an interface to certain spreadsheets.

- MANMAN/REPETITIVE™ provides for the planning and controlling of high-volume, low inventory, and short lead time manufacturing. The product supports build rate scheduling, work area inventory replenishment, and work-in-progress inventory consumption and costing.

- MANMAN/PROJECTS™ is an integrated project management system that monitors progress and tracks time and materials costs expended on projects.

- MANMAN/BARSCAN™ is an integrated bar code production system that permits fast and accurate data entry. It prints bar codes on various turnaround documents, creates custom bar code menus, and outputs bar coded labels.

- MANMAN/QUALITY™ tracks and analyzes product and process quality.

- MANMAN/TRACKER™ provides lot tracking and reporting requirements, from purchase order receipt through production to final shipment.

Connectivity:

- MANMAN/ENGINEER™ integrates the engineering and manufacturing departments by providing an interface between MANMAN and CAE/CAD systems. This product has all the bill of material, engineering change control, and part number translation functionally contained in MANMAN/MFG, but in a separate work area data base.

- MANMAN/DATAPORT™ allows information to be transferred directly between MANMAN and certain third-party shop floor data collection systems. It also provides for electronic interplant inventory transmissions.

Customer Service:

- MANMAN/OMAR™ is an order management and accounts receivable system that provides automated customer quotation, order entry, billing, and sales analysis functions.

- MANMAN/SERVICEMAN® is a product service management tool that maintains customer, equipment, and contract information, tracks field service calls, monitors depot repair activity, and facilitates telephone/technical support operations.

Finance and Administration:

- MANMAN/AP™ is an accounts payable system that is fully integrated with MANMAN purchasing and general ledger functions.

- MANMAN/GL™ provides general ledger, budget maintenance, consolidations, journal processing, and financial statement presentation.

- MANMAN/FA™ is a fixed-assets product that manages depreciable and non-depreciable assets from acquisition through retirement.

- MANMAN/PAYROLL™ calculates and processes payroll checks and tracks employee, tax, and deduction information.

- MANMAN/HR™ is a human resources product that tracks employee activity, administers benefits, supports compliance

with government regulations, and controls the recruitment, application, and hiring process.

Decision Support:

- DecisionMaker[R] is a management reporting tool that summarizes key manufacturing, customer service, and financial information on-line and creates exception reports for high-level management.

- Users can modify MANMAN's standard reports or create their own using Cognos' QUIZ on the HP 3000 or Interactive Software Systems' UDMS on the DEC VAX.

ASK's MAXCIM software, acquired with NCA in August 1987, consists of integrated modules for manufacturing, financial, sales and marketing, administrative, and information management applications designed to assist management in planning and controlling manufacturing operations. The software is available for DEC VAX computers.

- ASK continues to enhance and support the MAXCIM product line for its existing base of approximately 600 customers. MAXCIM is also available on ASKNET as a processing service.

- ASK currently actively markets MANMAN (rather than MAXCIM) to prospective new customers.

ASK offers clients access to its MANMAN and MAXCIM software through its ASKNET remote computing service.

- ASKNET serves manufacturing companies whose current size and growth rate do not presently justify purchase of in-house turnkey systems. These customers are prime candidates for later conversion to in-house systems.

- ASK currently operates approximately 10 HP and DEC systems in support of its on-line remote processing services. There currently are approximately 100 processing clients.

ASK's Data 3 Systems division markets and supports manufacturing, accounting, bar code and distributed requirements planning (DRP), and processing planning systems for the IBM AS/400 and System/38.

- Data 3 Systems targets its products to midrange companies (firms with annual sales of $10 million or more) and medium-sized divisions of large corporations.

- Products include the following:
  - SIM/400 manufacturing, financial, bar code, and DRP packages are available for IBM AS/400 systems.
  - MRPS 38 manufacturing, financial, process, bar code, and DRP packages are available for IBM System/38 computers.
- Data 3 Systems is a domestic authorized Industry Remarketer of IBM business products, and an international Value Added Reseller of INTERMEC bar code data collection hardware.
- There are currently over 500 installations of Data 3 Systems' products worldwide.

ASK offers the following support services for its MANMAN and MAXCIM product lines:

- Warranty-Plus, an extended maintenance software subscription service, provides customers with normal software maintenance, product enhancements, and unlimited telephone consulting regarding ASK software features and procedures. The service is billed to customers on a quarterly or annual basis, in advance. Virtually all of ASK's customers purchase the Warranty-Plus service.
- ASK offers its MANMAN and MAXCIM customers a variety of software installation, technical support, user training, and education services, which are performed for a separate charge either at ASK's offices or at the customer's site. In addition to MANMAN training, more than 30 standard training courses ranging from systems management to MRP are available.
- ASK Assistance™ services include site-specific technical consulting, including system installation, implementation, and integration of ASK software with other systems.

ASK currently intends to extend/improve its product line in the following areas:

- Extend MANMAN systems capabilities to better handle the needs of manufacturers using repetitive/JIT manufacturing methods.
- Develop applications using a relational data base.
- Better address the needs of batch process manufacturers, and manufacturers who supply the automotive industry.

- Improve the connectibility of ASK's products to those of other manufacturing-related software products.
- Expand the current systems to incorporate the needs of multi-site, vertically integrated manufacturing companies.

Industry Markets

One hundred percent of ASK's revenue is derived from the discrete and process manufacturing industries.

ASK clients range from start-ups to Fortune 500 companies.

Many Data 3 Systems customers are Fortune 500 companies, with 31 of these companies having attained Class "A" status.

Geographic Markets

Approximately 85% of ASK's fiscal 1989 revenue was derived from North America and 15% from international sources. A three-year summary of source of revenue follows:

ASK COMPUTER SYSTEMS, INC.
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	6/89		6/88		6/87	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
North America	$158.2	85%	$124.3	88%	$89.9	92%
Europe	20.3	11%	13.5	9%	6.1	6%
Other	7.7	4%	4.6	3%	2.3	2%
TOTAL	**$186.2**	**100%**	**$142.4**	**100%**	**$98.3**	**100%**

ASK has over 40 sales and support offices worldwide.

ASK markets the MANMAN and MAXCIM products in the U.S., Australia, Canada, the U.K., France, Germany, Malaysia, the Netherlands, Singapore, Sweden, Switzerland, Taiwan, and Thailand through its own marketing organization. Distributors are located in India, Japan, and the People's Republic of China. MAXCIM products are also represented by distributors in foreign markets including France and Australia.

Data 3 Systems also has affiliates to market its products outside the U.S.

Computer Hardware

ASK's data center in Los Altos (CA) has 17 HP 3000 and 19 DEC VAX systems installed in support of program development, customer and internal support, and ASKNET processing services.

AUTO-TROL TECHNOLOGY CORPORATION
12500 North Washington Street
Denver, CO 80233
(303) 452-4919

Howard B. Hillman, Chairman, President and CEO
Public Corporation, OTC
Total Employees: 706
Total Revenue, Fiscal Year End 9/30/88: $78,225,000

The Company

Auto-trol Technology Corporation, incorporated in 1962, has been engaged since 1973 in the development, marketing, and support of computer-aided design, drafting, and computer-aided manufacturing (CAD/CAM) turnkey systems for the engineering, manufacturing, technical publishing, and telecommunications industries.

In May 1987, Auto-trol completed the restructuring of its European operations.

- Prior to May, the company participated in the European market through Italcad, a joint venture 49% owned by Auto-trol and 51% owned by Selenia Industrie Electroniche Associate S.p.A (Selenia), an unaffiliated Italian company.

- Auto-trol exchanged its 49% interest in Italcad for 100% of the assets of subsidiaries in England, Sweden, Germany, and France.

- Selenia granted Auto-trol marketing rights in Europe (excluding Italy). Auto-trol agreed to provide its software technology to Selenia and to provide updates through 1990. As a result of the termination of the joint venture, Auto-trol incurred a liability to Selenia of $756,000.

- Following the restructuring, Selenia now concentrates on the Italian market, while Auto-trol focuses on the balance of Europe.

During 1987, Auto-trol changed its fiscal year end date from December 31 to September 30. For comparison purposes, fiscal 1987 amounts (pro-forma) represent Auto-trol's results for the twelve months ending September 30, 1987.

Fiscal 1988 revenue reached $78.2 million, an 11% increase over fiscal 1987 (pro-forma) revenue of $70.3 million. Net income for fiscal 1988 was $2.1 million, compared to net losses of $1.8 million for fiscal 1987 (pro-forma), which include charges of $3.3 million in anticipation of the European restructuring which occurred in May 1987. A financial summary follows:

AUTO-TROL TECHNOLOGY CORPORATION
FINANCIAL SUMMARY
($ thousands, except per share data)

ITEM	FYE 9/30/88	Nine Months FYE 9/30/87	FYE 12/31/86	12/31/85	12/31/84
Revenue	$78,225	$53,764	$62,358	$65,360	$68,927
• Percent increase (decrease) from previous year	*	*	(5%)	(5%)	27%
Income (loss) before taxes and extraordinary credit	$2,291	$1,162	$(7,038)	$(10,094)	$2,752
• Percent increase (decrease) from previous year	*	*	30%	(467%)	184%
Net income (loss)	$2,141	$1,162 (a)	$(7,038)	$(11,679)	$2,752
• Percent increase (decrease) from previous year	*	*	40%	(524%)	184%
Earnings (loss) per share	$0.32	$0.17 (a)	$(1.08)	$(2.43)	$0.58
• Percent increase (decrease) from previous year	*	*	56%	(519%)	169%

* *Results not comparable with previous periods.*

(a) *Includes an extraordinary credit of $547,000, or $0.08 per share, resulting from utilization of net operating loss carryforward.*

Revenue increases in 1988 and 1987 were attributed to the consolidation of the company's European subsidiaries as a result of the restructuring previously described, as well as significant increases in international revenues from distributors and Auto-trol's Canadian subsidiary.

Research and development expenditures were approximately $8.2 million (10% of revenue) for fiscal 1988, compared to $6.3 million (12% of revenue) for the nine months ending September 30, 1987, and $9.2 million (15% of revenue) in calendar 1986.

As of September 30, 1988, Auto-trol had 706 employees. As of May 1989, the company had 764 employees, segmented as follows:

Marketing and sales	342
Customer support	125
Research and development	159
General and administrative	138
	764

Auto-trol's primary competitors both domestically and internationally are Applicon (a subsidiary of Schlumberger, Inc.), Prime, IBM, Intergraph, and McDonnell Douglas.

Key Products and Services

Approximately 68% of Auto-trol's fiscal 1988 revenue was derived from turnkey system sales and 32% from turnkey-related services and parts.

A three-year source of revenue summary follows:

AUTO-TROL TECHNOLOGY CORPORATION
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FYE 9/30/88		Nine Months Ending 9/30/87		FYE 12/31/86	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
Sales	$53.2	68%	$35.4	66%	$39.1	63%
Service	25.0	32%	$18.4	34%	$23.3	37%
TOTAL	**$78.2**	**100%**	**$53.8**	**100%**	**$62.4**	**100%**

Auto-trol turnkey systems integrate standard hardware, operating software, proprietary graphics software, and applications software for companies involved in building design, industrial plant design, process plant design, electronic publishing, telecommunications, mechanical design and analysis, and machine tooling.

- Auto-trol systems are used by the architectural and engineering firms and similar departments within large corporations to prepare plans for office buildings, residential complexes, and industrial facilities.

- Plant design software is used by engineering and construction firms and by petrochemical operating companies to design new plants, laboratories, and offices and to prepare the documentation for plant modifications.

- Auto-trol systems are used by technical publishers to produce illustrations for proposals, presentations, engineering and manufacturing documentation, illustrated parts catalogs, and technical support manuals.

- Auto-trol systems are used by a wide range of manufacturing companies to design and document mechanical parts and products.

- Auto-trol currently has over 700 customers with over 1,800 workstations installed in 18 countries worldwide.

Since 1982, Auto-trol has positioned itself as a supplier of 32-bit engineering workstations with turnkey expertise in system integration within a distributed data processing environment. A heterogeneous local-area network (LAN) is available to provide communication pathways among all hardware platforms. Auto-trol systems are currently available for Apollo, DEC, and Sun Microsystems 32-bit computers.

Hardware components of Auto-trol systems include the following:

- The hardware platforms are based on Apollo, DEC, or Sun systems and can operate either as a standalone system or in a fully-interactive network of autonomous workstations.

- Auto-trol provides interfaces for its systems to various peripheral devices including plotters, digitizers, hard copy units, paper tape reader punches, word processors, pagination systems, phototypesetters, laser printers, scanners, vectorizers, and color film recorders.

- Auto-trol no longer markets or supports its proprietary Advanced Raster Workstations or Advanced Personal Workstations.

Auto-trol systems support Auto-trol Series 5000 Advanced Graphics Software for the architecture/engineering/construction (AEC) and technical publications markets and Auto-trol Series 7000 Advanced Graphics Software for the mechanical design market.

For the AEC marketplace, Auto-trol offers systems for the design, documentation, and maintenance of both commercial and industrial facilities. These products are built on the Series 5000 Advanced Graphics Software and include products for site engineering, plant engineering and design, piping, and modeling.

- The software allows users to interact with the system by entering commands, graphic positions, dimensions, symbols, and text by use of screen menus, keyboards, mouses, digitizers, joy sticks, and other devices thereby permitting users to rapidly create and revise three-dimensional graphic designs.

- Series 5000 provides an interactive macro language, Quick Actions, and macro programming facility to change an existing menu's layout, create new menus, modify button functionality, or add new capabilities and applications.

- Series 5000 can also directly communicate with external FORTRAN and C design and analysis programs, providing facilities for third-party software integration or access to external data.

- Series 5000 supports the creation of associative data structures that can be accessed and manipulated as independent, discrete objects.

  - Object attributes can be stored and accessed locally or be managed in an adjoining relational data base management system (RDBMS).

  - If the RDBMS system is used, an interactive, integrated subset of the SQL (Structured Query Language) command interface is made available to the graphics user for purposes of object selection, ad hoc attribute querying, Quick Action data input, and report generation.

Auto-trol's graphics software for corporate publishing is used by customers in the aerospace, manufacturing, automotive, and defense industries. These applications allow professional illustrators to create complex graphics for technical illustrations and presentations.

- The technical publishing systems offer a data base management capability, allowing the user to control access to the data base, track drawings in progress, archive drawings, and generate project management and accounting reports.

- Auto-trol provides various interfaces that allow the user to capture technical graphics from engineering CAD systems and publication archives by scanning, and transfer a variety of drawings and technical illustrations--complete with graphics and annotation text--to other publishing devices, including pagination systems, laser printers, phototypesetters, color film recorders, and color hardcopy devices.

For the mechanical design and manufacturing industry, Auto-trol offers programs for developing three-dimensional product models, including wire-frame, surface and solid modeling capabilities; analysis tools for kinematics and finite element modeling; and drawing production. These products are built on the Series 7000 Advanced Graphics Software.

- Auto-trol software provides three-dimensional modeling capabilities that allow users to build a design prototype, check it for structural integrity, prepare all engineering documents necessary to build it, and generate all machine tool controls to fabricate it.

- The Series 7000 has a built-in programming interface to allow integration with the user's software or with third-party programs.

- Auto-trol also offers ProEngineer (a trademark of Parametric Technologies) for conceptual design and modeling.

Auto-trol offers the Engineering Information Management System (EIMS), a job accounting and file management system for network-wide control and maintenance of CAD/CAM/CAE-based information, which integrates with EMPRESS, Auto-trol's relational data base management system .

A summary of Auto-trol's major graphics and application software products is shown in the exhibit.

EXHIBIT

AUTO-TROL SOFTWARE PRODUCTS

Product	Description
BUILDING DESIGN AND FACILITES SOFTWARE	
- FACILITY LAYOUT/OFFICE	Facility and furniture tracking system for planning, designing, and managing office facilities.
- PLAN	Architectural system for floor and ceiling plan generation.
- ILLUSTRATOR	Architectural rendering system for the creation of floor plans.
- BASE PLAN	Architectural system for floor and ceiling plan generation.
- LAYOUT	System for producing furniture and equipment layout drawings for offices.
- FACILITY LAYOUT/INDUSTRIAL	Facilities and equipment tracking system for planning, designing, and managing industrial plants.
- BASE DESIGN	General drafting package with on-screen user interface.
- STEEL-3D	Graphic and design system for 2- and 3-dimensional frame structures.
- A-FRAME	Drafting system for framing drawings for structural buildings.
- ELECTRICAL	Design and drawing system for light fixtures, circuit wiring, and power and communications centers.
- HVAC	Drafting system for creating heating, ventilating, and air conditioning plans and drawings.
- ATCOGO	Coordinate geometry system.
- VECTORPIPE	Piping model design, modification, and management with relational data base.
- RAP-PID	Process and instrument diagram generator.
- RAP-EL	Electrical schematic diagram generator.
- RAP-ISO	Isometric piping diagram generator.
- MOSS	Surface modeling design system for civil engineering.
- CONTROL SCHEMATICS	Electrical relay diagram generator.
- DUCTWORK DESIGN	System for design, analysis, and generation of ductwork models.
- PLANT FACILITIES DESIGN	Orthographic 2-dimensional piping drawing generator.
- BASIS	Base map generation and locational conversion system.
- ISOGEN	Piping system that descales/dimensions isometric drawings.
CORPORATE PUBLISHING SOFTWARE	
- TECH ILLUSTRATOR	Drawing tools for technical illustration for low cost monochrome workstations.
- TECH ILLUSTRATOR + PLUS	Drawing tools for technical illustration, including raster and on-screen digitizing.
- GRAPHIC DESIGNER	Presentation graphics software tools.
- Various interfaces	

EXHIBIT

(continued)

Product	Description
MECHANICAL DESIGN AND MANUFACTURING SOFTWARE	
- PRO/ENGINEER	Solid modeler for conceptual design.
- FINITE ELEMENT MODELER (FEM)	Node and element generator.
- FLAT PATTERN DEVELOPMENT	Interactive construction of a correctly dimensioned flat outline of a 3-dimensional model.
- AUTOMATIC NESTING SYSTEM	Tool for users to nest 2-dimensional parts for flame cutting.
- NUMERICAL CONTROL (NC)	Interactive system for 2,2-1/2, 3, and 5 axis machining that performs automatic tool path generation and tool path editing.
- NC PACKAGE	Combination of NC modules.
- NC PUNCHING MODULE	Two-dimensional machining system.
- NC LATHE MODULE	Lathe system.
- NC PROFILE/POCKET MODULE	System to produce rough, semi-finish, and finish profile operations for machining.
- NC SURFACE MILLING MODULE	Advanced surface milling.
- NC EDM MODULE	Two or four axis profile and tilt operation.
- NC FLAME CUTTING MODULE	Flame tool path generator.
- PROGRESSIVE DIE SYSTEM	Interactive graphics system for tool and die designers and manufacturers.
- NC PUNCHING	Allows users to automatically program tool paths for NC punches.
- SERIES 7000 GRAPHICS SOFTWARE	Menu-driven 3-dimensional geometric modeling system.
- ANALYSIS	Two- and three-dimensional mechanical property calculator.
- SURFACE MODELING	Creates surface models from wireframes.
- FLAT PATTERN DEVELOPMENT PACKAGE	Interactive construction of a correctly dimensioned flat outline of a 3-dimensional model.
- DIE DESIGN	Interactive system to design piercing, blanking, blending, compound, and progressive dies.
- BEZIER MODELING	Bezier curve modeling system.
- INTERACTIVE NESTING	Two-dimensional sheet metal nesting program.
- PDA/PATRAN-G INTERFACE	Translator from Series 7000 geometry to FINITE ELEMENT data.
- APPLICATION INTERFACE	Custom application writer.
- EAGLE	High level graphics programming language.
- COMPACT II SOURCE GENERATOR	
- APT SOURCE GENERATOR	
- Various post processors	

Customer support/maintenance services are provided by Auto-trol as follows:

- Maintenance service is provided under warranties, service contracts, or on a time-and-material basis.
- Service is provided by Auto-trol field engineers from over 40 locations in the U.S. and through the company's international subsidiaries and distributors, all of which provide installation, preventive maintenance, repair service, and assistance in solving customer operating problems. In addition, a technical support staff located in Denver is available to assist in servicing customer's systems.
- Telemaintenance, or remote diagnostics, is available on all hardware platforms.

Industry Markets

Auto-trol's customers include petroleum, pharmaceutical, and chemical companies; architectural and engineering firms; construction contractors; aerospace companies; federal, state, and local governments; retail merchandisers; public utilities; and manufacturers of industrial and consumer products.

Geographic Markets

Approximately 70% of Auto-trol's fiscal 1988 revenue was derived from the U.S. while the remaining 30% was derived from international sources. A three-year financial summary as segmented by geographic markets follows:

AUTO-TROL TECHNOLOGY CORPORATION
THREE-YEAR GEOGRAPHIC SOURCE OF REVENUE SUMMARY
($ millions)

	FYE 9/30/88		Nine Months Ending 9/30/87		FYE 12/31/86	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
U.S.	$55.0	70%	$41.6	77%	$52.1	84%
Europe	11.4	15%	$6.4	12%	$2.1	3%
Canada	8.1	10%	$4.7	9%	$6.9	11%
Other	3.7	5%	$1.1	2%	$1.2	2%
TOTAL	$78.2	100%	$53.8	100%	$62.3	100%

Auto-trol markets its products directly to end users in the U.S. from 25 sales offices.

The company markets its products in Europe through four wholly owned subsidiaries located in France, West Germany, Sweden, and the U.K.

The company markets its products in Canada through Auto-trol Technology (Canada) Ltd., a wholly owned subsidiary, and in Australia through a company sales office.

Export sales outside Europe, Canada, and Australia are handled by independent distributors and sales agents located in countries including Singapore, Taiwan, Korea, Indonesia, India, and the People's Republic of China.

COMPANY PROFILE

BARRISTER INFORMATION SYSTEMS CORPORATION
One Technology Center
45 Oak Street
Buffalo, NY 14203
(716) 845-5010

Henry P. Semmelhack, Chairman, President, and CEO
Public Corporation, AMEX
Total Employees: 414 (Full-time)
Total Revenue, Fiscal Year End 3/31/89: $31,877,000

The Company

Barrister Information Systems Corporation assembles, markets, and supports integrated turnkey systems and associated support services for the legal profession.

- Barrister was founded in 1972 as the Office Automation Division of Comptek Research, Inc. In March 1972, the division was spun off and incorporated to form Barrister.

- In July 1985, Barrister sold 500,000 shares of common stock in an initial public offering, resulting in net proceeds to the company of approximately $3.9 million. In July 1986, an additional 300,000 shares were sold in a second public offering, realizing net proceeds of approximately $4.2 million.

Barrister's strategy is to continue to develop its business in three key markets segments: microcomputers and local area networks (LANs), UNIX-based systems, and IBM AS/400-based systems.

- The company will focus on its distribution capabilities, strong service and support organization, and the depth and size of its client base. Barrister has also begun providing third-party maintenance services to law firms within its geographic markets.

- Barrister has adopted industry standards in all of its hardware and software products, allowing the company greater agility in establishing strategic partnerships and evaluating and acquiring new products from outside sources.

- Future investments in new products will represent a smaller percentage of revenue than in the past, because the company will be acquiring more of its products from outside developers.

- In July 1989, Barrister purchased certain software from Legal Eagle Software Systems, Inc. for 200,000 shares of Barrister

common stock, $225,000 in cash, and a $75,000 convertible subordinated debenture.

- Legal Eagle provided IBM AS/400 financial management software to law firms. Barrister will market the products as the Barrister/Eagle™ Series.

- As a result of the acquisition, Barrister has formed a strategic relationship with IBM as an Industry Remarketer of IBM AS/400, System/36, and PS/2 computers. Barrister will offer the Barrister/Eagle Series with the AS/400 and System/36. PS/2 computers can be networked with the AS/400, System/36, or the Barrister 3000 series computers.

Barrister's fiscal 1989 revenue was $31.9 million, a 16% decrease from fiscal 1988 revenue of $37.7 million. Net losses were $6.6 million in fiscal 1989, compared to net income of $188,000 in fiscal 1988. A five-year financial summary follows:

BARRISTER INFORMATION SYSTEMS CORPORATION
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	3/89	3/88	3/87	3/86	3/85
Revenue	$31,877	$37,710	$33,269	$29,331	$21,642
• Percent increase (decrease) from previous year	(16%)	13%	13%	36%	31%
Income (loss) before taxes	$(8,270)	$73	$1,449	$3,020	$1,314
• Percent increase (decrease) from previous year	*	(95%)	(52%)	130%	888%
Net income (loss)	$(6,595)	$188	$964	$1,645	$1,089
• Percent increase (decrease) from previous year	*	(80%)	(41%)	51%	793%
Earnings (loss) per share	$(2.16)	$0.06	$0.32	$0.64	$0.58
• Percent increase (decrease) from previous year	*	(81%)	(50%)	10%	729%

* *Percent change exceeds 1,000%.*

Barrister management attributes fiscal 1989 results to the following:

- Delays in completing certain products caused some of the company's existing clients to defer purchases or seek alternative products.

  - Barrister's Advanced Law Firm Management System (ALFMS) was scheduled for completion last year, but is now scheduled for release in fiscal 1990.

  - The company's MBIX™ operating system and 32-bit computers were to be available early in fiscal 1989, but were not installed in quantity until late in the year.

- The legal office automation market's rapid movement to microcomputers and standard "open" architectures increased Barrister's microcomputer business, but did not compensate for the 40% decline in minicomputer sales.

- Significantly smaller margins in the PC LAN market affected earnings.

Barrister spent approximately $4.6 million (14% of revenue) in fiscal 1989, $4.4 million (12% of revenue) in fiscal 1988, and $4 million (12% of revenue) in fiscal 1987 for product development and engineering activities.

Revenue for the six months ending September 30, 1989 was $14.4 million, compared to $15.1 million for the same period in 1988. Net losses were approximately $3.1 million, compared to net losses of $1.8 million for the same period a year ago. Last year's six-month net results included tax credits of $1.4 million.

- Results were attributed primarily to lower-than-anticipated sales of minicomputer products to new accounts. Delays in closing several contracts for add-on sales to existing clients also adversely affected sales.

As of June 1989, Barrister had 414 full-time employees and 14 part-time employees. Full-time employees are segmented approximately as follows:

Marketing	20
Product sales and support	37
Product service/application support	200
Product development and engineering	61
Clerical	73
Manufacturing and material handling	11
General and administrative	12
	414

Key Products and Services

Approximately 48% of Barrister's fiscal 1989 revenue was derived from new turnkey systems sales and add-on sales of hardware and software to existing clients. The remaining 52% of revenue was derived from consulting and support services associated with the installation, implementation, and maintenance of its turnkey systems.

A three-year summary of source of revenue follows:

BARRISTER INFORMATION SYSTEMS CORPORATION
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	3/89		3/88		3/87	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
Product sales (a)						
• Minicomputer	$12.3	39%	$20.5	54%	$20.2	61%
• Microcomputer	2.9	9%	2.0	6%	1.4	4%
	$15.2	48%	$22.5	60%	$21.6	65%
Services	$16.7	52%	$15.2	40%	$11.7	35%
TOTAL	**$31.9**	**100%**	**$37.7**	**100%**	**$33.3**	**100%**

(a) Includes add-on sales to existing customers of approximately $10.8 million in fiscal 1989, $14.9 million in fiscal 1988, and $16.7 million in fiscal 1987. Add-on sales include additional operator workstations, printers, disk storage, and software options.

Barrister assembles, markets, services, and supports integrated minicomputer and microcomputer-based turnkey systems for use by the legal profession. The company has installed more than 1,900 systems in private and public sector client sites throughout the U.S. and Canada.

Barrister's Law Office Management Systems are based on proprietary minicomputers and are offered primarily to medium- and large-sized laws offices, generally with more than 15 attorneys.

- Barrister manufactures substantially all of the CPUs and peripheral controllers included in these systems.
  - The company's earlier generation systems use 16-bit processors and Barrister's MBOS operating system.
  - Barrister's 3000 series computers, introduced during fiscal 1989, have a multiprocessor design, allowing up to six 32-bit processors in a single chassis. Front end processing is provided by a 16-bit processor. MBIX, Barrister's version of the UNIX operating system, supports the company's 32-bit computer line.
- Software is modular and functions can be added as needed. Applications available include the following:
  - Financial Management and Accounting
    - Accounts receivable
    - Accounts payable
    - Budget comparisons
    - Comparative profit and loss
    - Bank balance statements
    - Cash flow analysis
    - Automatic checkwriting and reconciliation
    - File indexing
    - Timekeeping
    - Client billing
    - Report generation
    - Financial modeling
  - Word Processing
    - WordManager™
  - Electronic Mail
    - Barrister/Messager™
  - Relational Data Base Management Software
    - Docketing
    - Litigation support
    - Case tracking

- Conflict of interest monitoring
- Personnel records
- File room indices
- Legal brief banks
- Library card catalogs

- Telecommunications and Networking

  - Barrister/Net, a local area network linking up to 50 CPUs
  - Data transfer between offices
  - Interfaces to IBM PCs
  - Interfaces to copier control and telephone management systems for client billing
  - Interfaces tc commercial ASCII data bases

Barrister also develops and markets microcomputer-based turnkey systems to small law offices and microcomputer networks to law firms of all sizes.

- Software available for the small law office includes the following:

  - B&TA™, a billing and time accounting system

  - ALFA™, an accounts payable and general ledger system

  - RESPA+™, a residential real estate settlement system

  - DELTA™, a docket control system

  - In addition, word processing, legal case management, data base management packages, electronic spreadsheets, and other commercially available MS-DOS programs run on Barrister's microcomputer-based systems.

- Barrister also offers microsystems networking capabilities to multi-user installations where information sharing is required. Microcomputers are networked using either Ethernet, LattisNet, or ARCNET LANs with Novell's Netware operating system software.

Barrister also markets and supports the Barrister/Eagle Series of systems for IBM AS/400 computers.

- Applications supported include time and billing, cost recovery, conflict of interest checking, general ledger, budgeting,

accounts payable, accounts receivable, check writing, trust accounting, payroll, and financial statements.

Maintenance and support services available to turnkey system clients include hardware and software installation, training, full service equipment maintenance, extended maintenance contracts, software program subscription service, hotline service, and on-site service. Barrister has also begun offering third-party hardware maintenance services to law firms in selected geographic markets.

Barrister Litigation Support Services include on-line processing services, case requirement analysis, data base design, document cataloging, indexing, abstracting and coding, data input, and data base maintenance.

Consulting and applications support is offered in the areas of litigation support, data base management, telecommunications, financial management, word processing, distributed automation, and needs assessment.

Barrister also provides a facilities management service for customers involved in relocation of their data centers or offices.

Industry Markets

Barrister derives virtually all of its revenue from the legal industry. Barrister has installed systems in over 350 law firms.

- Barrister clients include in excess of 10% of the 500 largest private law firms.
- The company has also installed its systems in state and local government offices.

Geographic Markets

Virtually all of Barrister's fiscal 1989 revenue was derived from the U.S.

Barrister maintains offices in Buffalo and New York City (NY); Atlanta (GA); Baltimore (MD); Chicago (IL); Cleveland (OH); Dallas and Houston (TX); Denver (CO); Detroit (MI); Hartford (CT); Los Angeles and San Francisco (CA); Miami and Tampa (FL); Bloomington (MN); New Orleans (LA); Philadelphia (PA); and Richmond and Arlington (VA).

Computer Hardware

Barrister operates a variety of its own minicomputer and microcomputer systems and various Data General Eclipse computers in its offices.

COMPANY PROFILE

BLUEBIRD SYSTEMS, INC.
5900 La Place Ct.
Carlsbad, CA 92008
(619) 438-2220

Hal Tilbury, President and CEO
Private Company
Total Employees: 180
Total Revenue, Fiscal Year End
10/31/88: 20,000,000*

* INPUT estimate

The Company

Bluebird Systems, Inc. (Bluebird), founded in 1982, offers microcomputer software and turnkey systems to multiple vertical and cross-industry markets.

INPUT estimates Bluebird's revenue is increasing and reached approximately $20 million for the year ended October 31, 1988.

Bluebird currently employs approximately 180 people.

Key Products and Services

Bluebird's systems software offerings include the following:

- Bluebird offers a proprietary microcomputer operating system, SuperDOS^{R}, that features a multi-user, multitasking environment. Some of the features provided by the operating system include: a multi-keyed ISAM for efficient file retrieval, record locking to maintain data integrity, advanced security features to prevent unauthorized access, and error checking and correction for reliable data communication.

- SuperDOS/Business BASIC^{TM} offers the same features of SuperDOS as well as an enhanced BASIC programming language based on Data General's Business Basic for minicomputers.

- DBComp Compiler is an enhanced version of Datapoint Corporation's Databus language. DBComp Compiler was developed for Bluebird by Sunbelt Computer Systems.

- Other compilers marketed by Bluebird include: Basic-2C^{TM}, Professional Pascal^{TM}, High C^{TM}, and RM/COBOL^{TM}-85.

- Bluebird's systems software products are designed for use on Intel 8088-, 80286- and 80386- based systems.

Bluebird's application software products run on the company's SuperDOS operating system and include the following:

- The Plant Manager™ is a fully integrated manufacturing management system for IBM PC, XT, AT, PS/2 and compatible systems that include the following modules:
  - Manufacturing Order Processing
  - MRP with Master Scheduling
  - Inventory Management
  - Production Control
  - Purchase Order Management
  - Bill of Materials
  - Sales Analysis
  - General Ledger
  - Accounts Payable
  - Accounts Receivable
  - Payroll
  - Fixed Assets
  - Job Costing
  - Reporter
- AutoMate is a car rental agency management system. The system is designed to handle multiple offices and fleets of between 100 and 2,500 vehicles.
  - AutoMate runs on multi-user microcomputers.
  - AutoMate has over 300 installations.
- VanS is a management system for van and storage companies.
  - VanS is compatible with SuperDOS.
  - There are approximately 300 installations of VanS.
- Word Manager is a word processing system for multi-user microcomputers.
  - Word Manager has approximately 400 installations, and licenses for $695.
- TURNS® is an integrated information management system for wholesale and retail distribution. TURNS automates the functions of order entry, inventory management, accounts receivable and purchasing.

- TURNS runs on multi-user, multi-tasking IBM PC, XT, or AT microcomputers.

• TRANSPRO/2 is a vehicle management system for IBM AT, PS/2, and compatible microcomputers. TRANSPRO/2 modules include the following:

- The Freight Accounting System is designed to handle the accounts receivable functions of a freight company.

- The Freight Settlements System is designed to handle the payroll functions of a freight company including generating bonus plans, earnings reports and the printing of 1099 forms.

- The Freight Billing System is designed to handle the billing functions of a freight company as well as posting the appropriate entries to the accounts receivable and accounts payable systems.

- Fuel & Mileage Reporting is designed to generate the reports required by each state based on fuel consumption and mileage figures. The system also generates a variety of summary and analysis reports useful for the analyzation of fleet operations.

- Freight Manifesting is designed to provide a means of creating manifests while entering bills. The system also tracks each manifest through its trip.

- Interline Payables handles the accounts payable aspects of interline carrier operations.

- Electronic Data Interchange enables processor-to-processor exchange of data on billing, ordering, and shipment information. The system will automatically perform certain business transactions with customer or supplier computers.

- The Vehicle Investment Analyzer is designed to assist management in determining the economics of replacing a vehicle, the optimum type of replacement vehicle, and the optimum option package for the replacement vehicle.

- The Vehicle Maintenance Reporting Standards Information System maintains a data base of vehicle maintenance records including maintenance supplier information associated with each maintenance record. The system enables a fleet manager to determine maintenance schedules, select service vendors, and analyze maintenance and vehicle investment.

Industry Markets

Bluebird targets its products to value added resellers (VARs) who sell to the appropriate vertical markets. Bluebird currently has a network of approximately 700 VARs selling its products.

Bluebird sells its operating system to transaction-oriented businesses in which system speed is crucial.

Geographic Markets

Bluebird sells its products primarily in the U.S. The company also has an international sales group, based in Carlsbad (CA), that promotes sales to the Pacific Rim, Canada, South America, and Europe. Sales are broken down approximately as follows:

U.S.	82%
International	18%
	100%

Computer Hardware and Software

Bluebird maintains a number of IBM PS/2s, WYSE 286s and 386s, and Altos microcomputers for development and support functions.

DEERE TECH SERVICES

John Deere Road
Moline, IL 61265-8098
(309) 765-4093

William Rankin, General Manager
Business Unit of Deere & Company
Total Employees: 97
Total Revenue, Fiscal Year End
12/31/88: $10,000,000 *
Noncaptive Information Services
Revenue: $4,000,000 *

*INPUT estimate

The Company

Deere Tech Services, formed in November 1986 as a business unit of Deere & Company, provides professional services to noncaptive clients in the design and implementation of computer-integrated manufacturing (CIM) applications.

- Deere Tech Services also provides software support services to its parent company in the areas of product planning and control systems, MRP support, product specification support, and support to the Manufacturing Engineering department.

INPUT estimates that Deere Tech Services' 1988 revenue reached $10.0 million, approximately a 40% increase over 1987 revenue of $ 7.2 million.

- Approximately 60% of 1988 revenue was derived from captive services provided to the parent company. As Deere Tech Services becomes more autonomous, a larger percent of revenue will be derived from noncaptive sources.

- INPUT estimates Deere Tech Services' revenue will increase by 45% during 1989.

Deere Tech Services became a member of the IBM Commercial Systems Integration program in August 1987 and an IBM Authorized Application Specialist in January 1988.

As of December 31, 1988, Deere Tech Services had approximately 97 employees, segmented as follows:

Marketing/sales/consulting	25
Technical support	24
Manufacturing systems	40
Commercial product marketing	5
Administrative	3
	97

Deere Tech Services considers its major competitors to be the Big Eight consulting firms, major factory automation consultants, and in-house MIS staffs.

Key Products and Services

Approximately 80% of Deere Tech Services' noncaptive 1988 revenue was derived from professional services and 20% from software products and value-added turnkey systems.

Professional services provided to the manufacturing sector include manufacturing and network consulting; system development, design, and implementation; and education and training.

- Deere Tech Services Manufacturing Consulting group offers full life cycle assistance, from enterprise assessment evaluations, through management of the project, the implementation, and education and training of personnel.

- Education and training programs deal with the optimization of CIM implementation. Topics include Corporate Executive Management Overview, Planning and Implementing World Class Manufacturing, Production and Inventory Management, Cellular Manufacturing, Minimum Cost Production, and Managing Technology and Change.

    - Factory workshops provide hands-on sessions at selected John Deere facilities. Topics covered include The Focused Factory, Total Waste Elimination Strategy, JIT Production, and Local Area Networks.

    - Deere Tech Services Network Consulting group provides assistance in the planning and implementation of MAP, TOP, and user interfaces for CIM.

Software products released when the business unit was formed in 1986 include the following:

- John Deere Group Technology System (JD/GTS) is a parts classification system covering all phases of a part's life cycle from design and preparation for production, through manufacturing and shipment to customers.

  - Modules are available to support data entry, data extraction, analysis, modifications, file handling, and help facilities.

  - John Deere Design Retrieval system (JD/DRP), an option of JD/GTS targeted to the design group, allows an interface between the JD/GTS system and CADAM graphics package. The interface allows the design engineer to check the key features of a design part against the features of existing parts for alternatives.

  - JD/GTS runs on IBM 30XX, 43XX, and compatible mainframes under MVS.

- John Deere Nesting System (JD/NEST) provides optimal material utilization for just-in-time sheet metal parts production.

  - Options support plasma/laser/waterjet cutting, routing of single and multiple sheets, and waterjet, reciprocating chisel, and knife composite cutting.

  - JD/NEST directly accesses part geometry from many leading CAD/CAM, CADAM, and CADLINC systems.

  - JD/NEST is available for IBM 43XX and 30XX systems under VM or MVS and CADAM CAD/CAM software, and on CIMLINC POWER CIM workstations under UNIX.

- Assembly Variation Simulation System (JD/AVSS) provides a "what-if" approach to design tolerance assignment.

  - JD/AVSS predicts the effect of design tolerances and manufacturing variations before the prototype is built.

  - JD/AVSS runs on IBM PC AT and compatible microcomputers.

Deere Tech Services also provides John Deere Robot Repeatability Testing (JD/RRTE) hardware and software that determines robot positioning repeatability capabilities in production applications.

- JD/RRTE is used to acceptance test the performance of new robots and identify wear and sensor performance for preventative maintenance of robots.

- The JD/RRTE system includes an HP 71B computer with RAM plug-in modules, HP interface loop, HP Thinkjet printer and the John Deere ROM plug-in module. Options for an RS 232/HP-IL interface, additional RAM and others are available.

- There are approximately 20 systems installed for over 10 customers. The system cost is approximately $10,000.

Industry Markets

Approximately 75% of Deere Tech Services revenue was derived from the manufacturing industry and 25% from the Department of Defense.

Deere Tech Services clients include Jaguar, Winnebago, General Motors, Allied Automotive, Gates Rubber, Boeing, CAM-I, and the U.S. Air Force.

Geographic Markets

Approximately 85% of Deere Tech Services' 1988 revenue was derived from the U.S. and 15% was derived from Canada.

Computer Hardware

Deere Tech Services has seven IBM 3090-600 mainframes and various CIM workstations installed to support clients.

DELPHI INFORMATION SYSTEMS, INC.
31416 West Agoura Road
Westlake Village, CA 91361-4672
(818) 706-8989

Walter F. Bauer, Chairman and CEO
Richard R. Janssen, President
Public Corporation, NASDAQ
Total Employees: 184
Total Revenue, Fiscal Year End 3/31/89: $20,502,000

The Company

Delphi Information Systems, Inc., founded in 1976 as Delphi Systems, Inc., provides UNIX-based turnkey systems to independent agents and brokers in the property and casualty insurance industry.

- During fiscal 1988, IBM appointed Delphi to the Industry Remarketer Call Program for the IBM RT. The company is also a value-added reseller for Concurrent Computer Corporation.

- Delphi also provides interface software systems that link the mainframes of insurance carriers with the systems of independent agents and brokers.

Delphi has implemented a company sponsorship program with the objective of establishing various alliances with specific insurance carriers, whereby the insurance carriers recommend and support Delphi as agency automation solution to their preferred agents.

- In July 1988, Delphi announced the signing of a five-year, $40 million agreement with CIGNA Property & Casualty Agency Division, under which Delphi will deliver agency automation systems to targeted CIGNA agents and brokers.

  - CIGNA agreed to provide its agents with financial and other incentives to purchase a Delphi system, and also committed to minimum annual sales volumes.

  - Delphi also agreed to work with CIGNA to develop a single-entry electronic interface between an agent's Delphi system and CIGNA's policy processing systems.

  - During fiscal 1989, revenues from sales to CIGNA and to agents whose systems were either partially or totally financed

by CIGNA amounted to $5.4 million (including $1.5 million of software licenses sold directly to CIGNA).

- In June 1989, Delphi signed a nonexclusive agreement with AINetwork (a member company of the American International Group) appointing Delphi as a preferred provider of agency management systems to key AINetwork agents. Under the agreement, AINetwork will provide financial assistance to qualified AINetwork agents to facilitate the purchase of Delphi systems.

Fiscal 1989 revenue reached $20.5 million, a 9% increase over fiscal 1988 revenue of $18.7 million. Net losses were $710,000, compared to net losses of $1.7 million for fiscal 1988. A five-year financial summary follows:

DELPHI INFORMATION SYSTEMS, INC.
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	3/89	3/88	3/87	3/86	3/85
Revenue	$20,502	$18,734	$22,275	$19,136	$15,415
• Percent increase (decrease) from previous year	9%	(16%)	16%	24%	34%
Income (loss) from continuing operations before taxes	$(654)	$(1,733)	$1,331	$(1,153)	$433
• Percent change from previous year	62%	(230%)	215%	(366%)	197%
Net income (loss)	$(710)	$(1,725)	$1,095	$(1,487)	$396
• Percent change from previous year	59%	(258%)	(174%)	(476%)	89%
Earnings (loss) per share	$(0.18)	$(0.46)	$0.36	$(0.56)	$0.15
• Percent change from previous year	18%	(228%)	164%	(473%)	114%

Delphi management attributes fiscal 1989 results to the following:

- The company benefited from increased revenues from the CIGNA contract. Although the number of system shipments increased by 15%, the average sales price declined from previous periods. This decline was in part due to the

introduction of the IBM RT system in late fiscal 1987, which carries a lower price than those systems sold previously. In addition, the initial sales under the CIGNA agreement were for smaller systems than originally anticipated.

- Significant startup costs for the CIGNA agreement, and lower-than-historical average system sales prices contributed to net losses. Although substantial improvement was made over fiscal 1988, performance was adversely affected by the continuation of a "soft" market in the property and casualty insurance industry.

Total product development costs were approximately $3.3 million (16% of revenue) for fiscal 1989, $2.6 million (14% of revenue) for fiscal 1988, and $2.5 million (11% of revenue) for fiscal 1987.

Revenue for the six months ending September 30, 1989 was $10.1 million, compared to $10 million for the same period in 1988. Net losses were $478,000, compared to net income of $409,000 for the same period a year ago. Prior year's results were favorably impacted by a $1.5 million initial sale related to the CIGNA contract.

- The company has experienced continued financial improvement, as compared to the immediately preceding quarters. Delphi returned to profitability for the quarter ending September 30, 1989 due to actions taken to reduce operating expenses.

As of March 31, 1989, Delphi had 184 employees, segmented as follows:

Sales and marketing	44
Product development	53
Customer service and operations	59
Administration and finance	28
	184

Major competitors include Insurnet, Agency Management Systems, Redshaw, and McCracken Computer.

Key Products and Services

Approximately 40% ($8.3 million) of Delphi's fiscal 1989 revenue was derived from new turnkey system sales, 27% ($5.5 million) from system upgrades and add-on sales, and 33% ($6.7 million) from maintenance, customer service, and other.

A three-year summary of source of revenue, as provided by Delphi, follows:

DELPHI INFORMATION SYSTEMS, INC.
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	3/89		3/88		3/87	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
System and upgrades (a)	$13.8	67%	$12.4	66%	$17.7	80%
Maintenance, service and other	6.7	33%	6.3	34%	4.5	20%
TOTAL	**$20.5**	**100%**	**$18.7**	**100%**	**$22.2**	**100%**

(a) Includes new system sales of approximately $8.3 million, $5.2 million, and $9.6 million for fiscal 1989, 1988, and 1987, respectively.

Delphi provides turnkey systems to independent agents and brokers in the property and casualty insurance industry for management, sales and marketing, policy administration, and accounting applications.

- During fiscal 1989, Delphi added 58 new customers, bringing the total to 202, an increase of 40% over fiscal 1988. The number of systems installed increased by 61, bringing the total installed base to 345, an increase of 21% over fiscal 1988.

- A five-year summary of Delphi's total number of customers and system installations follows:

	FISCAL YEAR				
ITEM	3/89	3/88	3/87	3/86	3/85
Total customers	202	144	110	82	62
Total installations	345	284	213	150	99

Delphi's primary product is the Automated Insurance Management System (AIMS), an integrated agency management and accounting system that can be tailored to the requirements of

either the nationwide or regional agent/broker, for personal, commercial, or specialty insurance lines. AIMS modules include the following:

- Management Information quantitatively measures agent/broker profitability by managing cash flow; monitors sales performance and profitability by individual salesperson, line of coverage, and insurance company; analyzes customer profitability; and assists in business planning.

- Sales and Prospecting assists in automating the development of new prospects and expanding sales to existing clients. The prospect information and follow-up feature provides the user with tools to gather information about prospective clients, including type of business, names of contacts, sales volume, payroll totals, growth rates, SIC codes, and square footage of facilities.

- Finance and Accounting provides for single-source entry of invoices that automatically updates accounts receivable, policy information, insurance carrier payables, general ledger, and various sales analysis reports.

- Client Servicing provides customer policy information management in order to support customer queries, renewals and endorsements of existing policies, and new policy issuance. The system prints out schedules of insurance coverage, applications to insurance carriers, and insurance proposals for prospective customers in a user-defined format.

- Carrier Marketing/Underwriting allows users to access all policy information and produce form letters. In addition, an automated policy-renewal and expiration-control system is provided.

- Corporate Management consolidates financial and statistical data (including those for budgeting and forecasting) for agents/brokers with multiple offices.

- Claims Tracking records and tracks insurance claims for customer servicing and analysis, risk management, and evaluation of the quality of insurance currently in force with insurance carriers.

- Office Administration integrates word processing with other modules to allow information from the customer file, policy file, or claims file to be inserted into form letters and insurance applications.

- Telemarketing (The Sales Center) enables an agent/broker to establish a telemarketing sales center within the agency to generate qualified leads for insurance producers. Telemarketing operates as a standalone system or can be interfaced with the AIMS system.

- The Universal Insurance Workstation (UIW), available within the AIMS system, is a workstation that operates on IBM PC, PC/XT, PS/2, or IBM-compatible microcomputers.

  - The UIW can act as a Delphi system terminal and at the same time can access insurance industry rating packages (which calculate premium amounts based on coverage and underwriting information), third-party PC-based software (such as Lotus 1-2-3, dBASE III Plus, and ORACLE), and public information networks.

- Electronic interface products link the mainframe computers of insurance carriers to the Delphi system terminals in agent/broker organization and permit the agent/broker to access one or more insurance carrier computer from each terminal.

  - These products enable the agent/brokers and participating insurance carriers to decrease the cost of manual entry of information concerning new policies, renewals, endorsements, and inquiries, and to reduce errors and response time.

  - As of March 1989, Delphi had installed electronic interface systems involving major insurance carriers, including Aetna, Atlantic Mutual, CIGNA, Chubb & Sons, Commercial Union, Crum & Forster, Fireman's Fund, Great American, Hartford, Island (Hawaii), Kemper, Keystone, Maryland Casualty, Reliance, Royal, Safeco, and Transamerica.

- AIMS modules are currently available for the IBM RT (supporting up to 154 users) and Concurrent XF500 (supporting 16 terminals) through XF800 (supporting over 150 terminals) systems. For fiscal 1989, nearly all systems sold were for the IBM RT. System prices range from $50,000 to $1 million.

Delphi provides add-ons and upgrades to its existing customers. These products consist of additional software, terminals, processor memory, storage devices, and CPUs for outlying locations or networked into the base system to support an increased number of users.

Hardware maintenance is purchased by Delphi for its customers from third parties, chiefly Concurrent and IBM. Administrative cost and profit is added to the cost of the services purchased from these companies to determine the price to the customer.

- Delphi provides a 60-day warranty on its software. In addition, the company normally enters into software maintenance contracts with its customers.

- Services are provided by the company's Service Desk, which is available to customers seven days a week, 24 hours per day.

Delphi also provides consulting, customized programming, and after-sale training services to its turnkey clients.

Industry Markets

One hundred percent of Delphi's revenue is derived from the insurance industry.

The company's target market is independent insurance agents/brokers who offer and sell property and casualty insurance policies covering such risks as fire, theft, and liability.

- Historically, Delphi has targeted the agent/broker with more than 10 employees as its principal customer.

- In fiscal 1988, with the introduction of the IBM RT-based system, Delphi was able to more vigorously pursue the lower end of the market.

Fred S. James & Company accounted for 11%, 20%, and 29% of revenue for fiscal 1989, 1988, and 1987, respectively. Sales associated with CIGNA contributed 26% to fiscal 1989 revenue.

Geographic Markets

One hundred percent of Delphi's revenue is derived from the U.S.

Delphi sells its products exclusively through its own sales organization which is divided into two groups: one concentrating on Insurance Company Sponsored Sales Programs and larger, multi-office agents/brokers operating nationally, and the other directed at regional agents/brokers.

Sales offices are located in Atlanta (GA), Charlotte (NC), Detroit (MI), Hartford (CT), Los Angeles (CA), Memphis (TN), Philadelphia (PA), Secaucus (NJ), and St. Petersburg (FL).

Computer Hardware and Software

Delphi has a number of Concurrent and IBM computers, operating under UNIX, installed at its data center in Westlake Village for product development and customer support.

COMPANY PROFILE

GERBER SCIENTIFIC, INC.
83 Gerber Road West
South Windsor, CT 06074
(203) 644-1551

H. Joseph Gerber, President
Public Corporation, NYSE
Total Employees: 2,050 (4/89)
Total Revenue, Fiscal Year End
4/30/89: $299,339,000

The Company

Gerber Scientific, Inc., founded in 1948, develops, markets, and supports CAD/CAM turnkey systems to automate the design and production processes in a range of industries, including apparel, automotive, aerospace, electronics, metalworking, printing, optical, graphic arts, and signmaking.

Gerber Scientific conducts its business through four principal operating subsidiaries as follows:

- The Gerber Scientific Instrument Company (GSI) designs, develops, manufactures, markets, and services turnkey interactive production systems and computer-controlled drafting and photoplotting systems which automate the production of phototooling and other documentation for printed circuit boards, film page layouts for the graphic arts industry, printing plates for the newspaper industry, and engineering drawings for a variety of applications.

- Gerber Garment Technology, Inc. (GGT) designs, develops, manufactures, markets, and services computerized systems for the handling, nesting, cutting, and spreading of flexible materials such as fabrics and composites, in the apparel, aerospace, automotive, footwear, furniture, and other industries.

- Gerber Systems Technology, Inc. (GST) designs, develops, manufactures, markets, and services turnkey systems for computer-aided mechanical design, manufacturing, and data management applications in the aerospace, automotive, industrial machinery, and consumer products industries.

- Gerber Scientific Products, Inc. (GSP) designs, develops, manufactures, markets, and services microprocessor-controlled production systems, principally for the signmaking, graphic arts, and optical lens manufacturing industries.

In December 1987, Gerber Scientific's GSI subsidiary acquired Cambridge Robotic Systems, Inc. (CRSI), for $3 million.

- CRSI designs and manufactures automatic optical inspection systems used in the inspection and qualification of high density printed wiring devices and phototooling.

In December 1987, Gerber Scientific's GSP subsidiary established Gerber Optical, which develops, produces, and markets optical lens manufacturing products.

Gerber Camsco, Inc. was merged into its parent company, GGT, effective April 30, 1987.

Fiscal 1989 revenue reached $299.3 million, a 13% increase over fiscal 1988 revenue of $264 million. Net income rose 11%, from $29.6 million in fiscal 1988 to $32.9 million in fiscal 1989. A five-year financial summary follows:

GERBER SCIENTIFIC, INC.
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	4/89	4/88	4/87	4/86	4/85
Revenue	$299,339	$263,983	$223,854	$191,786	$224,158
• Percent increase (decrease) from previous year	13%	18%	17%	(14%)	29%
Income before taxes	$50,852	$46,012	$34,357	$29,690	$43,859
• Percent increase (decrease) from previous year	11%	34%	16%	(32%)	74%
Net income	$32,852	$29,612	$21,057	$18,190	$25,059
• Percent increase (decrease) from previous year	11%	41%	16%	(27%)	71%
Earnings per share	$1.35	$1.15	$0.81	$0.70	$0.97
• Percent increase (decrease) from previous year	17%	42%	16%	(28%)	54%

(a) Restated to reflect a three-for-two stock split to shareholders of record June 22, 1987.

Research and development expenditures (including net capitalized amounts) were approximately $19.7 million, $18.4 million, and $17.8 million for fiscal 1989, 1988, and 1988, respectively. Gerber Scientific also received and spent approximately $2.6 million, $3.3 million, and $1.9 million for fiscal 1989, 1988, and 1987, respectively, for customer-funded research and development projects.

Revenue for the six months ending October 31, 1989 was $150 million, a 6% increase over $141.1 million for the same period in 1988. Net income for the period increased 3%, from $15.3 million to $15.8 million.

Key Products and Services

Gerber Scientific derived 100% of its fiscal 1989 revenue from CAD/CAM turnkey products and maintenance services.

Gerber Scientific, Inc. markets the following products:

- Gerber Garment Technology (GGT)

  - The Gerber Creative Designer™, released in 1988, enables fashion designers to view and modify their creations on-screen in different colors and fabrics.

  - The GERBERspreader®, released in 1988, is a fabric management system designed especially for fabric spreading. It provides enhanced fabric utilization and increased cutting room efficiency.

  - The AccuMark 300™, released in 1988, is a microcomputer-based grading and marking system. It features pattern design, automatic sizing, marker making, and GERBERcutter data generation.

  - The AM-5 3200™ Series Design, Grading, and Marking System, released in 1988, is a minicomputer-based multitasking, multiuser system designed to maximize fabric utilization and minimize style turnaround time.

  - The AccuPlot 300™ and AccuPlot 700™ High Speed Pen Plotters are high quality plotters, compatible with the AccuMark 300 and AM-5.

  - GERBERmover® GM-100 and GM-200 systems used computerized instruction to move and control the work flow among sewing operators in the apparel and allied industries.

  - GERBERcutter® systems automatically cut precise parts out of layers of flexible material such as textiles, leathers, vinyls, plastics, fiberglass, and advanced composite materials. The systems use Hewlett-Packard 1000 Model 2113E minicomputers.

    - The GERBERcutter S-95 low- and medium-ply cutter is the newest addition to Gerber's automated cutting systems.

    - The GERBERcutter S-93 cuts medium plies of fabric from a half inch to two inches of compressed thickness.

    - The GERBERcutter S-91 and S-93 traveling conveyor systems feature a conveyorized cutting surface that can be moved from one spreading table to another.

- The MM-5™ is an intermediate-priced grading and marker making system.

- The GERBERsaver™ is designed to increase material use by reducing the amount of waste when eliminating flaws discovered in material.

- The GERBERlaser™ is a cutter for the footwear industry.

- The Gerber Mechanical Pattern Cutter eliminates the handcutting of patterns in the shoe industry.

- The GM-510™ Pattern Grading and Engineering System is a grading system that grades and plots shoe pattern parts.

- The Apex II® Grading and Design System is an interactive design system for the shoe industry.

- CP-600™ is a Hewlett-Packard-based data management system that automatically matches marker combinations against fabric utilization and cutting costs to achieve the most effective and lowest cost apparel production order.

- GGT's Gerber Camsco, Inc. systems include the following:

  - The AM-5 Color Pattern Grading and Marker Making System, introduced in 1982, is a low-cost turnkey nesting, pattern grading, and marker-making system designed for use by apparel manufacturing firms of all sizes. The system uses a Hewlett-Packard 1000 Model A-600 minicomputer, a digitizer, a plotter pattern cutter, and a graphics workstation.

  - The GRADAMATIC-5®, introduced in 1983, is a high-performance, low-cost grading and pattern-cutting system for smaller apparel manufacturers. It includes a Hewlett-Packard microcomputer, a digitizer, cutter plotter, and optional minigraphics display. The system is upgradable to a full-design and marker-making system.

  - The MARKAMATIC[R]-5000 is a pattern-making and nesting system that has been further developed into the COMMAND 1000 system for the aerospace and metalworking industries. These systems include a Hewlett-Packard 1000 Model A-600 minicomputer. The COMMAND 1000 system has a built-in accounting and reporting system; it monitors raw stock and inventory levels and includes a cutting management system for control of cutting operations.

  - The APEX II system provides the footwear industry with a style development capability. It is based on a Hewlett-Packard 1000 Model A-600 minicomputer. Features include interactive pattern design, shell grading for upper and lower components, three-dimensional entry for style and mold generation, cost analysis, multicolor plotting, and pattern cutting.

- Gerber Scientific Instrument Company (GSI)

  - CAMtec II[TM] is a MicroVAX-based CAD system for the design and manufacture of tooling requirements for printed circuit board fabrication.

  - The LDI 9620[TM] is a laser photoplotter that creates phototool plans for circuit board design and manufacturing.

  - The 1850 Automatic Optical Inspection System[TM] inspects printed circuit boards for fabrication defects by comparing the printed wiring board to the original design data base.

  - CIMS 9000[TM] is a computer-integrated manufacturing system that collects, converts, stores, and distributes design and manufacturing data to CAD systems, numerically controlled (N/C) machines, drill machines, and GSI plotting systems.

  - The 2600 VectorScan[TM] is a high speed scanner that converts printed circuit board artwork into digital computer data.

  - AutoPrep systems automate the film mask preparation process in the graphic arts industry.

- The PC 800 Model 4™ is an interactive turnkey production system designed for manufacturers of printed circuit boards. The system generates artwork masters, solder masks, production masters, silkscreen masters, component drawings, parts lists, net lists, and bill of materials, as well as N/C drill tapes and N/C tapes for automatic component insertion and sequencer machines.

  - The system features color graphics option to differentiate multilayers of design with seven different colors on a large raster scan display. It incorporates GSI digitizers, plotters, photoplotters, and a Hewlett-Packard 1000 Model 2113E or 2114E minicomputer.

- The Gerber Model 3234 UltraPLOTTER, introduced in fiscal 1989, is a large area photoplotter for the production of high-density printed circuit board artwork.

- The Model 9725 Laser Photoplotter and Controller, also announced during fiscal 1989, is a high performance printed circuit board imaging system.

- The Model 41 Printed Circuit Board Photoplotter™ produces printed circuit board artwork masters and associated manufacturing aids for single, two-sided, and multilayer boards.

- GSI produces a range of flatbed and drum plotters of varying sizes, speeds, and accuracies.

- Gerber Scientific Products (GSP)

  - Gerber Optical, markets products that manufacture plastic eyeglass lenses.

    - In 1986, the Optical Manufacturing System (OMS™) was introduced. It is a microprocessor-based system that produces patterns for use in shaping ophthalmic eyeglass lenses to fit their frames. The system includes a Frame Tracer™, which records the shape of the frame lens opening, and a Pattern Generator, which machines a disposable plastic pattern to the required shape.

    - OMS/Network provides direct communications between the optician and the optical lab.

    - The OMS Surface Generator is a computerized machine tool used solely for plastic eyeglass lens manufacture.

    - The OMS Lens Edger uses the data from the OMS Frame Tracer to cut and bevel the lens to fit the eyeglass frames.

- GerberScanner II^{R}, released in 1989, automatically transforms scanned images into data files ready for cutting into permanent sign-face films on GSP's microprocessor-controlled signmaking and graphic arts systems.

- GerberTracer^{TM}, released in 1989, is a microcomputer-based digitizing system that allows the creation of graphics from an original piece of artwork.

- LetterSmith^{TM}, released in 1989, is a desktop lettering system that cuts letters from a variety of adhesive-backed materials which can then be applied to any smooth surface.

- The HS 750^{TM} is a high-speed plotter for the signmaking industry. It produces high-quality lettering up to 30" high.

- SuperSprint^{TM}, released in 1988, is a high-speed, automated vinyl film cutting system for the signmaking and graphic arts industries.

    - The S/4E Engraver/Router^{TM} engraves on a variety of materials and also routs three-dimensional letters and designs.

    - The computerized SPRINT 48^{TM} manufactures signs with relief or stencil-out lettering from wood, brass, aluminum, plexiglass, and other materials.

    - The Signmaker^{R} IVB and Graphix 4B are second generation microprocessor-based systems for cutting pre-spaced letters and graphic elements and feature plug-in program module cartridges. Modules are available for autolayout and letter outlining.

- Gerber Systems Technology (GST)

    - SABRE-5000^{TM} is the current generation of high-performance workstations and software for mechanical design, metalworking, and related applications. It features the UNIX operating system and an open software architecture for third-party and user-developed programs.

- SABRE-5000 CAD software includes products for wireframe and shaded surface geometric modeling, drafting of design details and dimension, composition and layout of engineering drawings, generation of parts lists and bills of material, and automated output of drawings via pen plotters and electrostatic plotting machines.

- SABRE-5000 manufacturing software supports graphic generation of toolpath data for N/C profiling, pocketing, lathe operations, and multi-axis machining of complex surfaces.

- The company has a Value-Added Reseller (VAR) agreement with Hewlett-Packard for the SABRE-5000 software.

- Previous systems include the Autograph single-terminal, single-tasking workstation; the IDS-80, a multi-terminal shared logic system; and the SRM-1 Shared Resource Manager, a network product. Parts files can be communicated in both directions between these older systems and the SABRE-5000.

Gerber provides maintenance services to its clients through a worldwide field service force.

Industry Markets

Approximately 62% of Gerber Scientific's fiscal 1989 revenue was derived from the discrete manufacturing industry and 38% from cross-industry signmaking and graphic arts applications.

Gerber Scientific's revenue is derived from clients in the apparel, automotive, aerospace, electronics, metalworking, printing, optical, graphic arts, and signmaking industries.

Geographic Markets

Approximately 48% of Gerber Scientific's fiscal 1989 revenue was derived from the U.S., and 52% from international sources. A three-year geographic source of revenue summary follows:

GERBER SCIENTIFIC, INC.
THREE-YEAR GEOGRAPHIC SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	4/89		4/88		4/87	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
U.S.	$144.2	48%	$123.3	47%	$119.0	53%
Europe	85.0	29%	83.2	31%	61.8	28%
Far East	45.7	15%	38.7	15%	30.2	14%
Other (a)	24.4	8%	18.8	7%	12.9	5%
TOTAL	$299.3	100%	$264.0	100%	$223.9	100%

(a) Includes revenue from Canada, Latin America, and other countries who contributed less than 1% to revenues.

Major U.S. sales offices are located in Atlanta, Chicago, Dallas, Detroit, Hartford, Los Angeles, New York City, and Washington D.C. Additional sales offices are located in numerous metropolitan areas.

Western European subsidiary sales and service subsidiaries are located in Belgium, France, West Germany, Italy, Sweden, and the U.K. Additional sales and service subsidiaries are in Australia, New Zealand, Hong Kong, Japan, and Canada.

- During the first quarter of fiscal 1990, two new foreign subsidiaries were formed. GST Far East Ltd. was established in Hong Kong to be responsible for GST sales and customer support in the Pacific Rim. GGT International de Mexico SA de CV was set up to perform the same functions for GGT's products in Mexico and Central America.

Gerber Scientific's products are also sold in other parts of the world by independent sales representatives.

Computer Hardware and Software

Gerber Scientific has the following equipment installed:

- 2 HP 3000s Series 70, operating under MPE V, at its South Windsor headquarters
- 1 HP 3000 Series 48, operating under MPE V, at Gerber Europe in Belgium
- 1 HP 3000, operating under MPE V, at Gerber Camsco in Texas
- 2 HP 3000s Series 58 and 70 operating under MPE V at GSP

COMPANY PROFILE

HBO & COMPANY
301 Perimeter Center North
Atlanta, GA 30346
(404) 393-6000

Walter S. Huff, Jr., Chairman, President, and CEO
Public Corporation, OTC
Total Employees: 1,810
Total Revenue, Fiscal Year End 12/31/88: $187,409,000

The Company

HBO & Company was formed in 1974 to provide turnkey systems and associated support services to the health care industry. As a result of the February 1985 acquisitions of Mediflex Systems Corporation and Amherst Associates Inc., HBO now also provides application software products, processing services, and systems operations (facilities management) and custom programming professional services. The company's target market is short-term acute care hospitals.

HBO re-examined its business and refocused its business strategies when the company's revenue and operating income growth rates declined in 1985. In 1986, HBO positioned itself for future growth by reorganizing with a profit orientation toward the delivery of both products and services, unbundling the pricing of its products, selling its non-information services consulting business, reducing staff, and streamlining operations.

HBO's current business consists of four principal units, as follows:

- The Minicomputer Group provides minicomputer-based turnkey systems to hospitals for patient care, nursing, physician, laboratory, pharmacy, radiology, and financial applications. This group is HBO's largest business, with over 600 employees and 1988 revenue of $88 million.

- The Mainframe Group provides mainframe-based application software products, systems engineering, systems operations, and consulting services to large, complex metropolitan health care institutions. In 1988, this group's revenue was over $42 million.

- The Decision Support Group provides processing services, turnkey systems, and software products to assist hospital management in planning and analysis of their operations. This group's 1988 revenue was $28 million.

- Medical Systems Support, Inc. (MSSI) is a wholly owned subsidary which provides computer hardware and other equipment maintenance services to HBO clients and certain other customers. MSSI's 1988 revenue was approximately $28 million.

HBO's 1988 revenue reached $187.4 million, a 7% increase over 1987 revenue of $175.2 million. Net income was $12.5 million in 1988, compared to net income of $13.3 million in 1987. A five-year financial summary follows:

HBO & COMPANY
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	1988	1987	1986	1985	1984
Revenue	$187,409	$175,230	$154,822	$188,835	$145,371
• Percent increase (decrease) from previous year	7%	13%	(18%)	30%	54%
Income (loss) before taxes	$19,020	$21,030 (a)	$(8,454) (b)	$35,194	$30,071
• Percent increase (decrease) from previous year	(10%)	349%	(124%)	17%	55%
Net income (loss)	$12,519	$13,321	$(3,612)	$20,842	$18,278
• Percent increase (decrease) from previous year	(6%)	469%	(117%)	14%	53%
Earnings (loss) per share	$0.80	$0.62	$(0.16)	$0.90	$0.80
• Percent increase (decrease) from previous year	29%	488%	(118%)	13%	48%

(a) Includes a net pretax gain on disposition and write-down of investments of $5.9 million, which reflects a $9.8 million gain on the sale of land acquired in 1982 for a corporate campus, less several write-downs of investments totaling $3.9 million.

(b) Includes a one-time charge against earnings of $9.4 million to cover workforce reductions and other steps to increase operating efficiency.

HBO management attributes 1988 results to the following:

- Revenue in 1988 increased 7% over 1987 due primarily to increased software license fees, hardware sales, hardware maintenance fees, and customer service fees.

- In February 1988, HBO completed the sale of its Computer Resources, Inc. (CRI) subsidiary. If the revenue from CRI were excluded from 1988 and 1987 financials, HBO's 1988 revene would show a 9% increase over the prior year.

- Included in the operating results for 1987 were a number of nonrecurring items related to proxy fight expenses and net gain of the sale of real estate. If these one-time items are excluded (for comparative purposes), HBO's 1988 net income of $12.5 million would represent a 14% increase over 1987 results.

- Earnings per share were dramatically affected by the sizable stock purchase program completed by HBO during the first quarter of 1988. The company bought 8.6 million shares of its common stock, or approximately 37% of the shares outstanding at the time. As a result of the reduction in shares outstanding, improved profitability, and a lower effective income tax rate, earnings increased 29% over 1987 levels.

In February 1988, HBO sold CRI to Infomed (Princeton, NJ). Terms of the sale were not disclosed.

- HBO originally acquired an 83% equity interest in CRI during 1984 and 1985.

- Headquartered in Pompano Beach (FL), CRI provides minicomputer- and microcomputer-based turnkey systems to home health care agencies.

- Computer Resources contributed approximately $193,000 to HBO's 1988 revenue and $3.2 million to 1987 revenue.

Revenue for the nine months ending September 30, 1989 reached $143.6 million, a 6% increase over $135.8 million for the same period in 1988. Net income rose 20%, from $7.6 million to over $9.1 million.

As of December 31, 1988, HBO had 1,810 employees. The company currently has approximately 1,800 employees.

HBO's primary competitor is Shared Medical Systems.

Key Products and Services

Approximately 53% of HBO's 1988 revenue was derived from minicomputer-based turnkey systems and maintenance services, 26% from professional services systems operations and customer support services, 15% from software product licenses (6% from MediPac and CliniPac mainframe products and 9% from decision support products), and 6% from decision support processing services. A three-year summary of source of revenue follows:

HBO & COMPANY
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	1988		1987		1986	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
Turnkey systems						
• Monthly service fees	$31.9	17%	$32.8	19%	$34.9	23%
• Hardware sales	25.2	13%	22.4	13%	5.0	3%
• Software licenses	15.0	8%	7.4	4%	8.0	5%
• Maintenance	28.1	15%	24.1	14%	16.2	10%
• CRI	0.2	--	3.2	2%	4.5	3%
• Discounted service agreements	--	--	--	--	8.5	6%
	$100.4	53%	$89.1	52%	$77.1	50%
Professional services						
• Systems operations	$16.4	9%	$17.1	10%	$18.5	12%
• Customer support services	31.8	17%	26.6	15%	16.2	10%
	$48.2	26%	$43.7	25%	$34.7	22%
Software products						
• Mainframe	$10.5	6%	$8.7	5%	$5.5	4%
• Decision support	16.6	9%	16.0	9%	(a)	(a)
	$27.1	15%	$24.7	14%	$5.5	4%
Processing services					(b)	(b)
• Decision support	$11.7	6%	$16.9	10%	$34.4	22%
Other (c)	--	--	--	--	$3.1	2%
Total	$187.4	100%	$175.2	100%	$154.8	100%

(a) Included with decision support processing revenue.

(b) Includes decision support software product revenue.

(c) Includes Amherst consulting revenue (sold in 1986).

HBO provides a range of products and services to hospitals for patient, clinical, and financial information management and decision support applications.

- The company's primary target market is the 3,000 short-term acute care hospitals in the U.S. of more than 100 beds.

- As of December 31, 1988, there were 243 users of HBO's patient information systems, 178 users of HBO's departmental (clinical) information systems, 277 users of HBO's financial systems, and over 850 decision support systems sold.

- HBO currently has over 950 hospital clients nationwide.

The two-year summary that follows lists unit sales for certain of HBO's primarily product offerings as of December 31, 1988.

HBO & COMPANY
SYSTEM INSTALLATIONS

	UNITS SOLD	
SYSTEM	1988	1987
Minicomputer Systems		
• CLINSTAR		
- Patient Care	14	13
- Laboratory	11	10
- Radiology	14	6
- Pharmacy	14	14
• Star Financial System	3	1
	56	44
Mainframe Systems		
• MediPac - Financial System	9	9
• CliniPac - Patient Care	8	3
	17	12
Decision Support Systems		
• Processing	11	49
• TRENDSTAR	65	65
• Micro products	102	118
	178	232

Turnkey systems are currently marketed primarily under equipment purchase agreements and software license agreements.

- Under equipment purchase and software license agreements, a

customer pays a one-time fee for the purchase of the hardware and a renewable multiyear license to use the software.

- HBO has curtailed its service agreement pricing for turnkey systems. Under service agreements, a customer paid a monthly fee for the use of the software and related hardware over the life of the agreement. Monthly service fees are derived primarily from seven-year contracts with hospital clients.

Turnkey systems marketed by HBO include the following:

- MEDPRO[R] is a Four Phase-based patient information system. HBO actively marketed MEDPRO from 1974 to 1985.

- CLINSTAR™ - Patient Care (formerly MEDSTAR) is a patient information system that incorporates all the capabilities of MEDPRO plus functions to support concurrent DRG analysis and reporting. The system is based on Data General Eclipse minicomputers and can serve hospitals up to and in excess of 1,000 beds.

- CLINSTAR systems for departmental applications are based on Data General Eclipse minicomputers. The systems are available as standalone products or can be integrated with each other and/or MEDSTAR. Systems include:

  - CLINSTAR-Lab interconnects all areas of the hospital laboratory.

  - CLINSTAR-Radiology allows for the scheduling of patients, procedures, and radiology resources.

  - CLINSTAR-Pharmacy provides for the administrative and clinical needs of the hospital pharmacy.

- The STAR Financial system, introduced in 1988, incorporates the same data base technology as the MEDSTAR and CLINSTAR systems and completes the Data General minicomputer-based STAR family of products.

  - HBO also plans to make STAR products available for DEC and Hewlett-Packard minicomputers.

- IFAS[R] is an HP 3000-based financial information system that supports patient billing and accounting, payroll/personnel, inventory, accounts payable, general ledger, and financial reporting. As of December 31, 1988 there were 105 IFAS users.

- GALAXY™ is a Four Phase-based system designed for hospitals with fewer than 150 beds. Applications include patient administration, order communications, DRG/case mix analysis, patient accounting/accounts receivable, general ledger, payroll/personnel, accounts payable, inventory, and fixed assets. As of December 31, 1988 there were 19 Galaxy users.

Mainframe software products provided by HBO include the following:

- MediPac® is an IBM 4300-based patient registration and accounting system. As of December 31, 1988 there were 150 MediPac users.

- CliniPac™ is an IBM-based patient information system that may be integrated with MediPac.

- Both mainframe products can interface with HBO's CLINSTAR departmental systems.

HBO's decision support processing services and products are targeted to the needs of the managers and the executives of the hospital.

- Revenue from decision support processing is declining and is being replaced by increased one-time sales of decision support software.

- HBO markets the TREND family of products for decision support applications.

  - TRENDSERVE is HBO's on-line processing service.

  - TRENDSTAR is a DEC MicroVAX-based turnkey system. The DS II Series, introduced in 1988, is HBO's latest generation of TRENDSTAR applications for DEC MicroVAX systems.

  - TRENDPAC I is IBM mainframe software available for in-house use.

  - HBO's TREND decision support systems use client general accounting, cost accounting, and medical records and statistical data to assist in preparing DRG analysis, annual business plans and budgets, management and control reporting, financial modeling, strategic and financial

planning, reimbursement enhancement, and regulatory reporting.

- TRENDSTAR/DS II applications include the following:
  - The Hospital System Library is a budgeting and forecasting tool. It is also available as a processing service.
  - The Case Mix Library allows hospital administrators to analyze their patient load, the types of services most often used, how efficiently physicians are performing, and information about the hospital's market and business characteristics. It is also available as a processing service.
  - The Marketing Systems Library, introduced in late 1987, is a management tool that analyzes data on hospital customers and competitors.
- The company also markets several PC-based decision support products, which do not contribute significantly to revenue.

Professional services provided by HBO include the following:

- HBO provides facilities management services to about 20 client hospitals, generally under one- to three-year contracts. HBO typically supplies its MediPac and CliniPac systems to the customers' IBM mainframe and personnel for management, software installation, customization, and support services.
- HBO also provides customer support services to all of its clients, including installation of systems, custom programming, and software maintenance.

Medical Systems Support, Inc. (MMSI), HBO's wholly owned subsidiary, provides maintenance services for equipment installed at HBO client sites. Currently MMSI maintains Four Phase-Motorola, DEC, Hewlett-Packard, and Data General computers.

- During 1986, the company added maintenance services for diagnostic imaging and other clinical equipment, and has since begun supporting data communications and telecommunications equipment. MSSI's goal is to be able to provide hospitals with a single source for all their equipment maintenance needs.
- The principal market for MSSI is the 2,100 hospitals in the U.S. with more than 200 beds. The company also markets to a few government agencies and other selected customers.

Industry Markets

Virtually all of HBO's revenue is derived from hospitals. A small percentage is derived from maintenance services provided by MMSI to government and other clients.

Geographic Markets

One hundred percent of HBO's revenue is derived from the U.S.

HBO has sales and services offices in Atlanta (GA), Rolling Meadows (IL), Dallas and Houston (TX), Amherst and Lexington (MA), Los Angeles and Foster City (CA), Mt. Laurel (NJ), Pittsburgh and Wayne (PA), Southfield (MI), Elmsford (NY), Louisville (KY), St. Louis (MO), and Tampa (FL).

MMSI is headquartered in Lewisville (TX).

Computer Hardware and Software

HBO has data centers in Atlanta (for customer support/research and development) and Amherst (for decision support applications). These centers have various computers installed from Data General, DEC, Hewlett-Packard, and IBM.

INTERGRAPH CORPORATION
One Madison Industrial Park
Huntsville, AL 35807-4201
(205) 772-2000

James W. Meadlock, Chairman and CEO
Eliott James, President
Public Corporation, OTC
Total Employees: 7,300 (12/88)
Total Revenue, Fiscal Year End
12/31/88: $800,160,000

The Company

Intergraph Corporation, incorporated in 1969 as M&S Computing, Inc., designs, manufactures, markets, and supports interactive computer graphics systems, including hardware and application software. Intergraph also markets its CLIPPER family of workstations and servers.

- In December 1988, Intergraph formed the CLIPPER Products Division to market its workstations and servers unbundled from the company's application software, and CLIPPER board-level products.

  - The CLIPPER processor features Reduced Instruction Set Computer (RISC) architecture, with performance levels ranging from 4 to 20 MIPS.

  - This division employs approximately 140 people, including hardware and software engineers. An additional 35 to 40 people in Intergraph's sales staff are dedicated to the division.

Total 1988 revenue reached $800.2 million, a 25% increase over 1987 revenue of $641.1 million. Net income rose 26%, from $69.9 million in 1987 to $88 million in 1988. A five-year financial summary follows:

INTERGRAPH CORPORATION
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	1988	1987	1986	1985	1984
Revenue	$800,160	$641,083	$605,737	$526,405	$403,762
• Percent increase (decrease) from previous year	25%	6%	15%	30%	60%
Income (loss) before taxes	$138,799	$115,783	$123,472	$118,537	$109,550
• Percent increase (decrease) from previous year	20%	(6%)	4%	8%	90%
Net income (loss)	$87,986	$69,876	$70,362	$67,779	$62,936
• Percent increase (decrease) from previous year	26%	(1%)	4%	8%	115%
Earnings (loss) per share	$1.55	$1.23	$1.26	$1.25	$1.22
• Percent increase (decrease) from previous year	26%	(2%)	1%	3%	110%

Intergraph management attributes increases in net income during 1988 primarily to the following:

- A 25% increase in revenues
- A 1.7% increase in gross margin
- A 3.0% decline in the effective income tax rate

Earnings for 1988 were affected by several factors, including:

- Increased research, development, and marketing expenses associated with the introduction of new products
  - Product development expenditures were $89.2 million (11% of revenue) in 1988, compared to $67.5 million (11% of revenue) in 1987, and $57.7 million (10% of revenue) in 1986.
  - Marketing expenditures were approximately $118.4 million (15% of revenue) in 1988, compared to $90 million (14% of

revenue) in 1987, and $76.5 million (13% of revenue) in 1986.

- Major investments in new international operations in Japan, Korea, Taiwan, New Zealand, and Switzerland.

Revenue for the nine months ending September 30, 1989 was $616.4 million, a 5% increase over $585.3 million for the same period a year ago. Net income declined 11%, from $63 million to $56.3 million. Declines in earnings were attributed to higher marketing expenses and lower gross margins.

- Sales and marketing expenses increased 38% compared to the same period in 1988, due to an increased headcount and the following prevailing industry trends: lower sales dollars per seat; growing interest in UNIX-based solutions (Intergraph VAX unit sales were down 50% from the same period in 1988); and buyer hesitation and confusion due to rapidly changing product cycles.

- The gross margin on systems declined 2.1 percentage points to 53.1%, due to a lower-than-anticipated planned shipment volume, the strength of the U.S. dollar in Europe, and a competitive marketplace.

Recent acquisitions and divestitures made by Intergraph include the following:

- In October 1989, Intergraph announced it had reached a definitive agreement for the acquisition of Quintus Computer Systems, Inc. of Mountain View (CA). Terms of the acquisition were not disclosed.

  - Quintus, incorporated in 1984, supplies Prolog-based software development tools. The company's major offering is the Prolog Integrated Environment, a complementary set of software tools for developing both knowledge-based and traditional applications.

  - Quintus had revenue of approximately $3.3 million for calendar 1988, and currently has 37 employees.

  - Quintus will operate as a wholly owned subsidiary of Intergraph.

- In December 1988, Intergraph sold its 82% interest in Tangent Systems Corporation to Cadence Design Systems Inc. in exchange for 1.3 million shares of Cadence stock. Tangent is a

supplier of IC layout software. The agreement is worth approximately $14.4 million, and Intergraph's ownership interest in Cadence is approximately 6%.

- In September 1988, Intergraph acquired ANA Tech Corporation. ANA Tech is a supplier of scanning and image processing products, including the Eagle line of high-resolution scanners and the Vana hardware raster-to-vector/raster converter. There were eight employees at the time of acquisition.

- In October 1987, Intergraph purchased certain assets and all technology and intellectual property rights of the Advanced Processor Division (APD) of Fairchild Semiconductor Corporation for approximately $6.3 million. APD supplies the CLIPPER microprocessor chipset used in Intergraph's line of graphics workstations.

- In September 1987, Intergraph sold all the outstanding common stock of its subsidiary, Intergraph South Africa (Pty.), Ltd., for $3.4 million, realizing a gain of approximately $1.9 million on the sale.

- In June 1987, Intergraph acquired a 50% interest in Bentley Systems, Inc., a computer graphics software development company, through the issuance of 148,148 shares of its common stock.

As of December 31, 1988, Intergraph had 7,300 employees. The company currently has over 7,900 employees worldwide.

Intergraph competitors include the following:

- In the workstation market, Intergraph considers its major competitors to be Sun Microsystems, Apollo/Hewlett-Packard, and DEC.

- In the CAD/CAM/CAE market, Intergraph considers its competitors to be IBM, DEC, and Prime/Computervision.

Key Products and Services

Intergraph reports its revenue in two categories: Systems, which includes turnkey systems and professional services revenue; and Service, which includes maintenance revenue. A three-year summary of source of revenue follows:

INTERGRAPH CORPORATION
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	1988		1987		1986	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
Systems	$590.7	74%	$464.0	72%	$468.1	77%
Service	$209.5	26%	$177.1	28%	$137.6	23%
TOTAL	**$800.2**	**100%**	**$641.1**	**100%**	**$605.7**	**100%**

Intergraph workstations and servers, based on the CLIPPER processor, provide a broad range of performance. The 100 and 200 Series are Intergraph's low-end offering. The midrange 300 Series brings enhanced performance both in input-output and graphics applications. The 3000 Series offers mainframe processing power.

Intergraph manufactures, markets, and supports the CLIPPER-based workstations and servers, as follows:

- The InterPro^{R} series is a single-screen workstation with 15-inch, 19-inch, or 27-inch color displays. The 15-inch and 19-inch displays offer a pixel addressability of 1184 by 884. The 27-inch offers 1664 by 1248 pixels. All InterPro models come with a keyboard and mouse.

  - The 27-inch InterPros can be configured to include a 25.5- by 24.5-inch worksurface with a menu tablet and cursor.

- The InterAct^{R} series is a dual-screen, high-performance workstation with multimode processing capabilities. The 19-inch high-resolution (1184 by 884 pixels) color screen permits simultaneous viewing of different parts of a design or model.

  - The work surface can be used for digitizing drawings up to D-size.

- The InterView^{R} workstation is a dual-screen workstation with 19-inch high-resolution color screens. The workstation provides for large-scale digitizing, and can be operated with a variety of digitizing tables, including backlit tables for cartographic

applications.

- The InterServe™ general-purpose servers, introduced in 1987, provide mainframe performance in a multiuser environment. Functions such as plotting and communications between the workstation and the mainframe can be done on the server to improve graphics performance.

Intergraph currently has over 36,000 workstation installations worldwide.

Intergraph's MicroStation product line takes the company's IGDS graphics software and makes it available for microcomputers.

- MicroStation is available for various operating environments, including MS-DOS (MicroStation PC), UNIX (MicroStation 32), and Macintosh II (MicroStation Mac).

- MicroStation is priced at $3,300 for any of the three platforms.

Intergraph markets and supports 32-bit DEC VAX-based central processors, including the MicroVAX II-based Intergraph 200, 250, and 252; the CVAX-based Intergraph 350 and 380; and the VAXBI-based 6300 Series.

- The InterMap Analytic, introduced in 1985, is a combination workstation/analytical stereoplotter designed to support photometric applications.

Intergraph has announced plans to bundle the Looking Glass software from Visix Software Inc. as the user interface to its workstations.

Intergraph offers special-purpose peripherals, including scanners, scanner/plotters, photoplotters, and industry-standard disk drives, electrostatic and pen plotters, color and monochrome hard copy devices, tape drives, alphanumeric terminals, screen image cameras, line printers, and other devices.

Intergraph offers systems tailored to a broad range of applications. Historically, the company has derived the majority of its revenues from systems for land use and resource management, process and power design, energy exploration, and architectural and engineering design.

Intergraph's software offerings are used for a wide variety of applications, which include the following:

Architectural & Engineering Design:

- Intergraph's Architectural and Engineering Design System automates the total project design and management process. With this software, a firm can develop and model building concepts, produce all construction documents, and manage space in a finished facility.

- The system is offered as a set of compatible modules to serve the needs of large or small architectural firms, interior design firms, engineering firms, and corporate or government facility management offices.

- Included are capabilities for producing 3-D models of design concepts, architectural drawings, specifications, and engineering plans, including HVAC, electrical, and plumbing. Packages to optimize facility usage are offered for strategic planning, space planning, and facility management.

Civil Engineering:

- The Intergraph system features software for creating 2-D and 3-D structural models for analysis and completion of steel and concrete drawings.

- The Intergraph civil engineering system also provides functions for developing site plans for buildings, streets, highways, and airports, and for design of facilities to carry electricity, water, gas, and sewage.

Mechanical Design and Manufacturing:

- For the manufacturing market, Intergraph offers Mechanical Design and Manufacturing Software to automate the complete product development cycle, from design through analysis to documentation and manufacturing. Clients use the system to design mechanical parts and assemblies in three dimensions, defining complex parts with specialized sculptured surfacing and solids modeling software.

- Engineering software evaluates product designs for functional and structural integrity. Finite element modeling and analysis software evaluates designs by simulating stresses encountered in end use. Other products analyze mechanisms, cams, linkages, and plastic parts and molds.

- Manufacturing software includes systems for numerical control programming of milling, drilling, punching, turning, and cutting

machinery. Material use and cutting cycle optimization products are also available for sheet metal and other flat stock manufacturing. A data management system organizes shared product data bases for tighter coordination and management of all phases of the product cycle.

Electrical Design and Engineering:

- Intergraph offers modular products in support of electrical engineering, design, and analysis activities that can be used in any order to perform specific design tasks.

- The electrical products address the design of control systems for aerospace engineering, substation design, facility design and management, electromechanical design, and railway signaling design.

Electronics Design and Manufacturing:

- Customers in the electronics industry use the Intergraph Electronics Design System to combine all phases of the circuit design-to-manufacturing process within a shared, relational data base.

- An integrated suite of CAE/CAD/CAM workstation-based tools is offered for the production of printed circuit boards, application-specific integrated circuits (ASICs), programmable logic devices (PLDs), and hybrid microelectronic devices. Also offered are iconic user interfaces, a microcomputer-based hierarchical schematic capture package, additional analog analysis tools and libraries, and EDIF 200 netlist conversion tools.

- Intergraph also offers third-party software for its CLIPPER workstations, including digital simulation and analysis; hardware simulation and acceleration; logic synthesis; thermal, vibration, and reliability analysis.

Electronic Publishing:

- Intergraph's Electronic Distributed Publishing System automates the preparation and publication of the documentation required by design, engineering, and mapping projects. With this integrated system, companies can produce repair and assembly manuals, map books, product guides, proposals, catalogs, training manuals, and similar documents. The system enables the user to create and preview pages, complete with text and illustrations, and then output the results

to a typesetter without ever passing through the paper stage.

- The Distributed Publishing System includes products for word processing, composition/pagination, presentation graphics, and illustration. Scanning and image processing capabilities incorporate photographs and hard copy line art as document illustrations.

Geographic Information Systems:

- Intergraph is a major supplier of interactive graphics systems for land use and resource management applications.

- Customers include military and civilian mapping agencies, local governments (for managing land records and conducting tax appraisal operations), forest products companies, and other firms managing large tracts and performing resource studies.

Surveying and Cartography:

- Intergraph offers a range of products serving both the general mapping industry and other specialized mapping and surveying applications.

- Map data can be entered on the Intergraph system through direct digitizing of existing maps, from electronic survey instruments, or from a raster scanner. Software for edge-matching aids in the integration of map sections into a continuous map.

Utilities:

- Intergraph offers interactive graphics and data base management capabilities to support the design, engineering, and mapping workflow needs of utilities.

- Telecommunications, electric, gas, and water companies, as well as local governments, are using Intergraph's products for distribution engineering, substation engineering, transmission facilities design and management, power plant engineering, telecommunications, central office engineering, document and manual production, land and building planning, and land records management.

Plant Design:

- Intergraph's Plant Design System supports all the software needed to design process, equipment, piping, instrumentation, electrical, structural, and other design aspects of a plant.

- Specialized functions provide the capability to prepare 3-D plant models, create all required drawings, perform design analysis, prepare requisitions for equipment and commodities, and generate the full range of reports required for review and construction.

Energy Exploration and Production:

- Customers in the energy exploration and production industry use the Intergraph system for several different applications, including base mapping, lease mapping, seismic interpretation and evaluation, log analysis, and geologic mapping. The energy industries can perform complex analyses to locate subsurface hydrocarbons and mineral deposits from a single interactive computer graphics environment.

- Intergraph mapping and data base management software is used for managing ownership, jurisdictional boundary information, site access, and well information.

Intergraph offers the following software for its workstations and servers:

INTERGRAPH CORPORATION
SOFTWARE PRODUCTS

APPLICATION AREA/PRODUCT NAME	APPLICATION AREA/PRODUCT NAME
Architecture/Engineering/Construction AEC Shell Bridge Designer II CADMIN CIVILCAD DACIS Home Builder EE Schematic Facility Design and Management Software (FDM) GWN-DTM Digital Terrain Modeling InFlow InRoads InSite Integral Building Information System Calculation* Integrated Building Information System Text* InterSect IPOGO IsoRAM IsoVU MAESTRO Maproute Master Architect MicasPlus Series ModelView Project Series STAAD-III/ISDS VI DataViews Series* Electronics ABEL* ASIC Engineer/Series Amplifier Library Module Analog Series Applicon-In Translator Auto Board Tester Nucleus Automatic Placement BJT Library Module Benchtop Instrument Interface Bridgeport Drill & Router Postproc. CAM Engineer CASE Electronics Interface CSPICE Cost Effectiveness Analysis Program* Design Engineer Digital Analysis Tools Diode Library Module Direct Writing Machine Software Dynapert Series EDIF Netlister ESP 7200 Auto Board Tester Postprocessor Excellon Postprocessor Series Factron Postprocessor Series Feedback FutureNet Netlister GATES*	Intergraph/Mill Postprocessor Generator* Intergraph/Multi-Axis Milling Option Intergraph/NISA Interface Intergraph/Numerical Control Intergraph/Product Data Manager Intergraph/Product Data User Intergraph/Punch Option Intergraph/Sheet Metal Flat Pattern Package Intergraph/Thermal Cutting Option Intergraph/Wire Cutting Option MINT - Major Internal Structure Definition* MOLDFLOW MOLDFLOW-TP MOLDTEMP NCImStation NISA/3D-FLUID NISA-Composites NISAOPT PATCHGEN - Patch Generation PULSENET - Transient Waves in Networks RASDAS - Rational Structural Design Analysis RIMBAUD SEHAM SEPS SFOLDS - Naval Architecture Design Analysis SHELLDEF SILMA CimStation STRUC - Internal Structure Design STWKDES - Steelwork Design WAVENET - Steady Waves in Networks Miscellaneous C-macs® Editor Configuration Management Tool (CMT) FIBRPLAN IGES PARSER/VERIFYER KES (Knowledge Engineering System) MasterPlan Q-Calc Standard UniPress Emacs vi-PLUS WORD ERA Nucleus Software Packages INGRES Database Manager* INGRES Embedded Preproc. for C* INGRES Embedded Preproc. for FORTRAN* INGRES/Applications* InformixC-ISAM* Informix Run Time License* Informix-4GL Application Dev. Language* Informix-ESQL/C Emb. SQL & Tools for C* Informix-SQL RDBMS* Intergraph/Network File Manager

APPLICATION AREA/PRODUCT NAME	APPLICATION AREA/PRODUCT NAME
GDS II In/Out Interface GenRad Postprocessor Series Gerber Formatter* HILO Series* HP 306XX Auto Board Tester Postprocessor Hybrid Series** IKOS Hardware Simulator Interface Integri-Test Auto Board Tester Postprocessor JFET Library Module MOSFET Library Module Maintainability Effectiveness Analysis Program* Marconi 80X Auto Board Tester Postprocessor NC Nucleus Series OK Wire Wrap Postprocessor PCB Series** PDI 4000 Auto Board Tester Postprocessor Parasitic Parameters Analysis** Philips SMD MCM1 NC Inserter Postprocessor Pole/Zero Analysis Posalux NC Drill and Router Postprocessor Redac-in Translator Reliability Effectiveness Analysis Program* Scicards-In Translator Sieb & Meyer NC Drill and Router Postproc. Standard Logic WWM-XXX Wire Wrap Postproc. Starter Analog Library Module Statistical Analysis Module Stitchweld Model 357-N Wire Wrap Postproc. TDK NC Inserter Postprocessor Tiger-PCB Autorouter** Trudil Postprocessor Series Universal Postprocessor Series Wire Wrap Nucleus XILINX Netlister ZYCAD Hardware Accelerator Interface Zehntel Model 810 Auto Board Tester Postproc. Electronic Publishing DP/Manager DP/Manager User DP/Paint** DP/Presenter DP/Publisher** Wordperfect* Mapping CPS-3™ GWN-COGO Intergraph/Scanning Software Intergraph/Symbol Character Recog. Software Intergraph/Vectorization Software Map Publisher S.C.I.P.S. (Soil Cell Info. Parceling System) SpatialData TIGRIS Series	Intergraph/User Interface Builder ORACLE Easy*SQL Database Utility* ORACLE Pro*C Programmatic DB Interface* ORACLE Pro*FORTRAN Prog. DB Inter.* ORACLE RDBMS Base Product* ORACLE SQL*Utilities* ORACLE SQLNet Network DB Comm. Fac.* ORACLE SQL*Net TCP/IP DB Comm. Proto.* ORACLE SQL*Plus Database Utility* ORACLE SQL*ReportWriter Database Utility* Petroleum Software Packages ASSISTANT® CIRC EOW-PAK GASP LogStation Maya System PRESIM Stratamodel TDAS TerraStation VIP-COMP VIP-CORE CIP-DUAL VIP-ENCORE Vortext Plotting Software Packages Benson 96XX Device Drivers CalComp 107X Device Drivers Dot Matrix Device Driver Hewlett-Packard 7475 Device Driver Hewlett-Packard 75XX Device Driver InterPlot Intergraph Type 9 Raster Output Driver Shinko CHC645 Device Driver V80 Device Driver V80 Workstation Plotting Versatec 72XX Device Driver Versatec 74XX Device Driver Versatec 85XX Device Driver Versatec CE32XX Device Driver Versatec CE34XX Device Driver Xerox 4045 Device Driver System Software Packages BSC/3270* BSC/RJE* C Compiler* C+ + Translator* CS/200 Boot Image* Documenter's Workbench® EMACS** Figaro Run Time License* Fortran-77 Compiler*

APPLICATION AREA/PRODUCT NAME	APPLICATION AREA/PRODUCT NAME
Mechanical & Manufacturing AutoMod II Series Binary Cutter Location Interface B-LINES - Hull Form Definition BL2IG - B-LINES Interface to Intergraph BRITSHELL - Shell arrangement and plate devel. BRITSHIPS CODES - Conceptual Design System COSMOS/M DISPLAY II ELECTRO - Electrical Routing System ENDURE FEAP FIDAP GENSURF HS2IG - HULLSURF Interface to Intergraph HULLDAS - Hull Design Analysis System HULLGEN - Hull Form Generation HULLSURF - Hull Surface Definition IGCAD IGRIP Intergraph/Cooling Analysis Intergraph/2.5-Axis Milling Option Intergraph/3-Axis Mill & Lathe Postproc. Gen.* Intergraph/ANSYS Interface Intergraph/Cincom Interface Program Intergraph/Engineering Modeling System Intergraph/Finite Element Modeling/Solver Intergraph/Flow Analysis Intergraph/Image Man. & Graph. Editing Sys. Intergraph/Kinematics Mechanism Modeling** Intergraph/Lathe Option Intergraph/Lathe Postprocessor Gen.* Intergraph/MSC Interface Intergraph/Mechanical Drafting System Intergraph/Mechanism Modeling Intergraph/Mill and Lathe Postproc. Generator*	MFCbase MicroStation 32* MIcroStation 32 Customer Support Library* NKR BASIC Interpreter* Network File System* Pascal Compiler* Prior Graphical Kernel System (GKS)* QTC Math Advantage (C Version)* QTC Math Advantage (FORTRAN Version)* Remote File Sharing* SNA/3270* SNA/RJE* SoftPC* TCP/IP Intergraph Tektronix 4107 Terminal Emulation* Template Graphics Software Figaro* XNS/VTP* Translator Software Packages Applicon 8XX to Intergraph Translators* AutoCAD Translators* AutoTrol GS1000 to Intergraph Translator* CADAM Translators* CADD Translators* CATIA to Intergraph Translator* Intergraph Translators* POWRTRAN-PC Unigraphics II Intergraph Translator* Utilities Software Packages Electric FIDS Designer FRAMME Designer MicroStation 32 Raster Graphics Editor Telephone FIDS Designer Water FIDS Designer

**Indicates third-party software*
***Jointly owned by Intergraph and a third-party vendor*

Intergraph has the following marketing agreements:

INTERGRAPH CORPORATION
MARKETING AGREEMENTS

VENDOR	MARKETING AGREEMENT
Allen-Bradley	CMM, cell control
Automation Intelligence	Postprocessors
AutoSimulations Inc.	Graphical factory simulation
CAM Software Inc.	Expert systems, decision management systems
CHAM of North America Inc.	Computational fluid dynamics
Cincom Systems Inc.	RDBMS, application development system, business/manufacturing application software
Computerized Structural Analysis and Research	FEA
EMRC	FEA
Informix Software Inc.	RDBMS
Mechanical Dynamics Inc.	Kinematics/dynamic analysis
Moldflow Pty. Ltd.	Plastics processing analysis
Oracle Corp.	RDBMS
Precision Nesting Systems	Sheet metal nesting
Relational Technology Inc.	RDBMS
Research Engineers Inc.	FEA
Silma Inc.	Robotic programming
Structural Research and Analysis Corp.	FEA
Visitech Graphic Resources	Customized lease mapping solutions
3D Systems	Stereolithography for physical prototyping

The Federal Systems Division, which contributed an estimated 14% to 1988 revenue, provides Intergraph systems and associated support services to federal agencies. Contract examples include:

- A computer-integrated engineering system for the Space Station Freedom program under contract to the Boeing Company.
- An automatic graphics digitizing system for the Department of the Interior for $4.6 million.
- An automated design system to optimize Quantum Medical Systems' concept-to-manufacturing workflow. Quantum designs, markets, and supports a blood-flow imaging system used for diagnosing vascular diseases.
- An interactive graphics laboratory design and analysis system for Bayer AG, Leverkusen, West Germany.

Industry Markets

Intergraph markets its products to various industries, including aerospace, automotive, utilities, transportation, petroleum, construction, and the federal government.

Clients include Coca-Cola, Ford Motor Company, Colgate-Palmolive Company, Sverdrup Corporation, Moulinex, Corgan Associates Architects, Air Force Logistics Command, California Department of Conservation, Perkin-Elmer Corporation, and Metroscan.

Revenue from the U.S. federal government was approximately $111 million (14% of revenue) in 1988, $81.9 million (13% of revenue) in 1987, and $78.8 million (13% of revenue) in 1986.

Geographic Markets

A three-year summary of Intergraph's geographic source of revenue follows:

INTERGRAPH CORPORATION
THREE-YEAR GEOGRAPHIC SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	1988		1987		1986	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
U.S.	$492.9	57%	$404.6	58%	$420.8	66%
Europe	$230.0	29%	$185.8	29%	$129.0	22%
Other (a)	$77.3	14%	$50.7	13%	$55.9	12%
TOTAL	**$800.2**	**100%**	**$641.1**	**100%**	**$605.7**	**100%**

(a) Includes revenue from general international sources.

U.S. offices are located by region as follows:

- West Coast: Irvine, Pasadena, San Jose, and Solana Beach (CA); Portland (OR); Seattle (WA); and Phoenix (AZ).
- Western: Englewood (CO); Overland Park (KS); Metairie (LA); Tulsa (OK); and Austin, Dallas (2), Houston, and San Antonio (TX).
- Midwest: Bettendorf (IA); Indianapolis and Crown Point (IN); Birmingham and Lansing (MI); Minnetonka (MN); Ballwin (MO); Columbus, Cleveland, and Dayton (OH); and Milwaukee (WI).

- Southeast: Birmingham (AL); Winter Park and Tampa (FL); Atlanta (GA); Lexington (KY); Raleigh (NC); and Memphis (TN).

- Northeast: Bridgeport (CT); McLean (VA); Westborough (MA); Lyndhurst (NJ); Clinton and Rochester (NY); and King of Prussia and Pittsburgh (PA).

Intergraph has wholly owned foreign subsidiaries in Belgium, Denmark, Finland, France, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, the U.K., West Germany, Brazil, Singapore, Canada, Japan, and Korea.

- The company has majority owned or effectively controlled subsidiaries in Australia, Mexico, Venezuela, Taiwan, and Bahrain.

- Distributors also sell and service Intergraph products in Saudi Arabia, India, Indonesia, Japan, Korea, and Argentina.

Computer Hardware and Software

Intergraph has the following computers installed at its headquarters:

- 4 DEC VAX 11/730s, VMS
- 12 DEC VAX 11/750s, VMS
- 17 DEC VAX 11/780s, VMS
- 12 DEC VAX 11/785s, VMS
- 7 DEC MicroVAX IIs, Micro VMS

MENTOR GRAPHICS CORPORATION
8500 S.W. Creekside Place
Beaverton, OR 97005-7191
(503) 626-7000

Thomas H. Bruggere, Chairman and CEO
Gerard H. Langeler, President
Public Corporation, NASDAQ
Total Employees: 1,709 (12/88)
Total Revenue, Fiscal Year End
12/31/88: $300,750,000

The Company

Mentor Graphics Corporation, formed in 1981, designs, manufactures, markets, and services electronic design automation (EDA) turnkey systems for use in the design and analysis (computer-aided engineering, or CAE), physical layout (computer-aided design, or CAD), testing (computer-aided test, or CAT), documentation (computer-aided publishing, or CAP), and packaging (computer-aided electronic packaging, or CAEP) of complex integrated circuits, printed circuit boards, and electronic systems. In March 1988, Mentor Graphics also began offering computer-aided software engineering (CASE) products.

The company's strategy is to:

- Provide an integrated set of productivity tools across a broad price performance range to support the electronic engineer throughout the entire product development process

- Provide excellent customer service and support through a direct service force throughout the world

- Focus marketing, sales, and support resources on major account opportunities

As of December 31, 1988, Mentor Graphics had 1,709 employees. The company currently has over 2,000 employees.

Revenue for the nine months ending September 30, 1989 reached $281.7 million, a 30% increase over $217.2 million for the same period in 1988. Net income for the period rose 39%, from $23.8 million to $33 million.

- During the first nine months of 1989, Mentor has spent over $36 million on research and development. Release 8.0 of the company's electronic design automation product, which includes

its Concurrent Design Environment, will be demonstrated in the first half of 1990 and is scheduled for release next summer.

Mentor Graphics' 1988 revenue reached $300.8 million, a 36% increase over 1987 revenue of $221.8 million. Net income rose 65%, from $20.3 million in 1987, to $33.5 million in 1988. A five-year financial summary follows:

MENTOR GRAPHICS CORPORATION
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	1988	1987	1986	1985	1984
Revenue	$300,750	$221,823	$173,545	$136,748	$87,906
• Percent increase from previous year	36%	28%	27%	56%	240%
Income before taxes	$50,626	$31,740	$16,545	$12,082	$13,635
• Percent increase (decrease) from previous year	60%	92%	37%	(11%)	N/A
Net income	$33,540	$20,325	$11,000	$7,989	$9,888
• Percent increase (decrease) from previous year	65%	85%	38%	(19%)	*
Earnings per share	$1.92	$1.20	$0.67	$0.52	$0.71
• Percent increase (decrease) from previous year	60%	79%	29%	(27%)	889%

* *Percent change exceeds 1,000%.*

Mentor Graphics' management attributes 1988 results to the following:

- A 36% increase in system sales was due to continued growth and penetration in all international markets, particularly the Asia-Pacific; success of the Board Station PCB layout product; continued growth of the CAE business; a higher reorder rate from installed base customers; and the addition of new customers worldwide.

- Service and training revenue increased 36% during 1988 due to the continued growth in the company's installed base and improved pricing of customer maintenance agreements initiated in 1987.

- System gross margins were 62% in 1988, compared to 57% in 1987, and 49% in 1986. This increase is attributed to product mix shifting toward high value-added products (PCB product line) and lower computer hardware costs as a percent of selling prices. System gross margin growth is expected to moderate in the future due to competitive pricing pressures and moderation in the rate of change in product mix to higher value-added products.

Research and development expenditures were approximately $33.8 million (11% of revenue) in 1988, $24.2 million (11% of revenue) in 1987, and $16.8 million (10% of revenue) in 1986.

Acquisitions made by Mentor Graphics include the following:

- In December 1989, Mentor Graphics announced it would acquire Performance CAD of Sunnyvale (CA) for an undisclosed cash payment. Performance CAD develops integrated circuit timing analysis tools. Its principal product in the Circuit PathFinder, a static timing tool for the design and analysis of full custom integrated circuits.

- In June 1988, Mentor Graphics purchased Contour Design Systems, Inc. (formerly Acotech) of Menlo Park (CA) for $2 million. Contour Design Systems is a supplier of analog component libraries and modeling technology.

- In March 1988, Mentor Graphics announced it would acquire the Computer-Aided Software Engineering (CASE) Division and selected computer-aided engineering (CAE) technologies from Tektronix, Inc. for approximately $5 million.

  - Tektronix' Apollo-based CAE customers were offered the opportunity to migrate to comparable Mentor Graphics products free of charge. Customers using other hardware platforms will receive Apollo upgrade discounts from Mentor Graphics.

  - Mentor Graphics and Tektronix also announced a strategic alliance to develop an integrated set of design-through-test products. Tektronix has designated both Mentor Graphics and its Context Corporation subsidiary as the preferred suppliers of EDA and documentation management tools to Tektronix.

- In June 1987, Mentor Graphics acquired the fault-grading technology and products of Caedent Corporation of Colorado Springs (CO) for $450,000 plus future royalties.

Other significant announcements include the following:

- In September 1988, Mentor Graphics and EEsof, Inc. (Westlake Village, CA) announced a cooperative marketing agreement under which EEsof will market its microwave CAE design tools on the Mentor Graphics workstation platform and offer its interface to the Mentor Graphics EDA environment.

- Also in September 1988, Mentor Graphics endorsed the IEEE-1076 VHSIC Hardware Description Language (VHDL) standard. Mentor Graphics plans to deliver a VHDL product that is fully integrated with its design and analysis products.

- In September 1988, Mentor Graphics also joined the Open Software Foundation, which is dedicated to developing a UNIX-based open software environment.

- In June 1988, Mentor Graphics, Apollo Computer, and LSI Logic Corporation announced an agreement to link LSI Logic's Modular Design Environment software toolset and Mentor Graphics' IDEA Series design tools on Apollo workstations.

- Also in June 1988, Mentor Graphics announced an agreement with Minc Inc. (Colorado Springs, CO) to incorporate Minc's universal programmable logic device (PLD) synthesis tool into Mentor Graphics' board design and simulation environment.

Mentor Graphics is currently organized into the following divisions and subsidiaries:

- The Design and Analysis Division provides schematic capture, analog, and digital simulation products for system-level and ASIC design.

- The IC Division, formed in 1988, develops, markets, and supports integrated circuit design and layout products.

- The Electronic Packaging and Analysis Division, formed in January 1986, develops and markets CAEP systems.

- The Advanced Products Division was formed in October 1987 to focus on research and development of Mentor Graphics' next generation of software architecture and applications.

- The CASE Division, formed in March 1988 with the acquisition of Tektronix's CASE Division, provides computer-aided software engineering products for DEC VAX and Apollo systems.

- Context Corporation, an 85%-owned subsidiary of Mentor Graphics formed in 1986, designs, manufactures, markets, and services application software products for the CAP market.

- Mentor Graphics has sales subsidiaries in Western Europe, Canada, Australia, and the Far East.

Mentor Graphics' primary competitors and their major area of focus include the following:

- Cadnetix Corporation: CAE, CAD
- Intergraph Corporation: CAE, CAD, CAEP
- Hewlett-Packard: CAE, CAD, CAT
- Computervision Corporation: CAD, CAEP
- Schlumberger CAD/CAM: CAD, CAEP
- Daisy Systems Corporation: CAE, CAD
- Teradyne, Incorporated: CAE, CAT
- In the CAP market, competitors include Interleaf, Inc., Xyvision, Inc., Xerox, and Kodak
- In the CASE market, competitors include Cadre Technologies and Index Technology

Key Products and Services

Approximately 80% of Mentor Graphics' 1988 revenue was derived from integrated systems and 20% from maintenance and training services.

A three-year summary of source of revenue follows:

MENTOR GRAPHICS CORPORATION
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	1988		1987		1986	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
Systems	$241.3	80%	$178.0	80%	$148.6	86%
Service and training	59.5	20%	43.8	20%	24.9	14%
TOTAL	$300.8	100%	$221.8	100%	$173.5	100%

The Mentor Graphics IDEA Series™ of electronic design automation systems combines Mentor Graphics software with

general-purpose 32-bit Apollo workstations in support of design creation and analysis for integrated circuits and electronic systems, including the system itself and its enclosure, and physical layout of semicustom and custom very-large-scale integrated circuits and printed circuit boards.

- The company's systems may be linked over a high-speed local area network. Substantially all of Mentor Graphics' applications share a user interface and "Idealib" data base structure. The Idealib provides graphics processing, text processing, window management, data base management, and human interface capabilities.

- A customer may first choose to purchase the Capture Station^{R} workstation, which includes software for schematic design capture and electronic mail, and later upgrade to the Design Station^{R} workstation, which adds software for remote simulation and document preparation. Similarly, by adding software, Design Station users may upgrade to:

  - The Idea Station^{R}, for local logic simulation of a design

  - The Gate Station^{R}, for design and physical layout of gate array circuits

  - The Cell Station^{R}, for design and physical layout of standard cell circuits

  - The Chip Station^{R}, for design and physical layout of custom integrated circuits

  - The Board Station^{R}, for design and physical layout of printed circuit boards

  - The Package Station^{TM}, for design and analysis of enclosures for electronic systems, was introduced in February 1988 by Mentor Graphics' Electronic Packaging and Analysis Division. This product is fully integrated into the company's IDEA Series environment and provides direct access to the electronic component and layout data developed on the Board Station workstation.

- In May 1988, Mentor Graphics announced price reductions for IDEA Series workstations based on Apollo Series 3000 and 4000 workstations. Beginning in the third quarter of 1988, IDEA Series workstations now include the Apollo DOMAIN Series 3500 and 4500 Personal Workstations (under an Early

Delivery Program). IDEA Series 3500 workstations range in price as follows:

- The Series 3500 Capture Station with 8MB main memory is priced from $31,900.
- The Series 3500 Package Station is priced from $76,900.
- The Series 3500 Board Station with 8MB of main memory starts at $90,900.
- The Series 3500 Chip Station with 16 MB of main memory is priced from $95,900.

- There are currently over 15,000 IDEA Series workstations installed worldwide.

Mentor Graphics also provides optional software and special-purpose hardware for specific applications with the electronic product development process.

- PICED is a general purpose graphics editor that provides the engineer with a variety of graphic elements, text fonts, line styles, and fill patterns.
- Component Libraries and QuickParts™ and SmartParts™ simulation parts models provide the engineer with easily accessible and usable software models of electronic components.
- MSPICE™, MSPICE PLUS, and MSIMON™ are interactive circuit simulators that provide the engineer with analysis capabilities for the analog- or transistor-level behavior of circuits.
- REMEDI™ is a layout versus schematic checker used in full-custom IC design.
- QuickFault™ is a fault simulator that provides the design engineer with fault analysis for design verification and test pattern generation.
- QuickSim™ is a logic simulator that interactively allows users to simulate digital designs.
- QuickPath, announced in June 1988, is a graphical critical path analyzer that supports true worst-case minimum/maximum timing analysis for ASIC and board designs.

  - Mentor Graphics has a joint marketing agreement with Test Systems Strategies, Inc. (TSSI) whereby TSSI develops, manufactures, and markets interfaces between Mentor Graphics' QuickSim and QuickFault products and a range of commercial integrated circuit and printed circuit board test systems.

- The Hardware Modeling Library™ is a proprietary hardware product manufactured by Mentor Graphics that permits customers to integrate actual very-large-scale integrated components and semi-custom circuits into the logic simulation process, avoiding the need to develop complex software models to simulate these components.

- The Compute Engine™ accelerator is a general purpose micro-supercomputer manufactured by Mentor Graphics that accelerates a workstation's performance of compute-intensive tasks at various stages of the design process.

Through Context Corporation, Mentor Graphics markets and supports application software for computer-aided publishing applications.

- Mentor Graphics formed Context to take responsibility for the continued development of the DOC documentation preparation software product and ancillary products.

  - DOC continues to be included in the company's Design Station and higher level stations, but Context has been developing a broader market for the DOC product.

- Context is focusing its resources on meeting the documentation management needs of aerospace, manufacturing, and engineering companies.

  - The Context series of Documentation Workstations, based on Apollo computers, is used primarily in the production of engineering documentation specifications, maintenance documentation, and product manuals.

  - Pricing for the workstations ranges from $10,700 to $56,900. There are currently over 5,000 systems installed.

Mentor Graphics also provides computer-aided software engineering (CASE) products for DEC VAXstation computers running under ULTRIX, and VAX systems running under VMS.

- The Analyst/RT is used to create, verify, and document specifications for real-time systems using Structured Analysis.

- The Designer is used to create and verify Structured Design models of entire software systems.

- The Auditor is a CASE documentation and requirements traceability tool.

- The Table Editor is a tool used to edit control specifications created with the Auditor.

Mentor Graphics has a worldwide service organization to support its customers' needs for installation, maintenance, training, and documentation.

- Hardware maintenance services are performed primarily under contract by either Mentor Graphics or Apollo technicians. In North America, Mentor Graphics technicians provide hardware services to over 75% of the company's customers. The company plans to continue to expand its direct service capability in 1988.

- Tiered annual hardware and software maintenance contracts are available for approximately 12% of the purchase price.

Industry Markets

The target market for Mentor Graphics' products is electronics manufacturing companies, primarily in the aerospace, semiconductor, computer, telecommunications, and consumer electronics industries.

Mentor Graphics' clients typically consist of Fortune 500 electronics companies.

During 1988, Mentor Graphics received over 40 orders which were each in excess of $1 million. Fourth quarter multimillion-dollar orders were received from Apple , NCR, AWA Ltd. (Australia), and Samsung.

Geographic Markets

Approximately 52% of Mentor Graphics' 1988 revenue was derived from North America and 48% from international sources.

A three-year summary of source of revenue follows:

MENTOR GRAPHICS CORPORATION
THREE-YEAR GEOGRAPHIC SOURCE OF REVENUE* SUMMARY
($ millions)

	FISCAL YEAR					
	1988		1987		1986	
SOURCE	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
North America	$156.9	52%	$120.1	54%	$98.0	56%
Europe	77.5	26%	55.8	25%	39.2	23%
Asia-Pacific	66.4	22%	45.9	21%	36.4	21%
TOTAL	$300.8	100%	$221.8	100%	$173.6	100%

* *Excludes intercompany transfers and eliminations.*

In addition to corporate offices in Beaverton (OR), Mentor Graphics has sales and support offices in 51 locations worldwide.

Mentor Graphics sells its products almost exclusively through a direct sales force located in the U.S. and through wholly owned marketing subsidiaries in Western Europe, Canada, Australia, and the Far East.

- In early 1989, Mentor opened offices in New Delhi (India) and Beijing (China).

Computer Hardware

Mentor Graphics has over 400 computers installed at its various offices for research and development and customer support.

COMPANY PROFILE

REYNOLDS AND REYNOLDS COMPANY
115 South Ludlow
Dayton, OH 45401
(513) 443-2000

Terry D. Carder, Chairman
David R. Holmes, President and CEO
Public Corporation, NYSE
Total Employees: 5,035 (9/89)
Total Revenue, Fiscal Year End 9/30/89: $602,146,000
Computer Systems Revenue: $240,553,000

The Company

The Reynolds and Reynolds Company (Reynolds) was 1866 to manufacture and distribute standard and custo forms. Reynolds is currently organized in two operatin as follows:

- The Business Forms Division, with approximately 2,7 employees, manufactures and distributes printed bus and systems, custom continuous and snap-out forms, stock forms, and forms management services to auto professional, medical, and general business markets.

  - The Automotive/Automotive-Related unit supplies business forms and manual systems to automobile and truck dealerships. It also supplies the related automotive market, which includes tire dealers, repair garages, auto parts firms, body repair shops, and recreational vehicle dealerships.

  - The General Printing unit supplies printed forms, manual systems, custom continuous and snap-out forms, and forms management services to professional, medical, and general business markets. This unit includes the operations of the Arnold Corporation, which was acquired by Reynolds in May 1986.

  - Wilmer Service Line is a wholesale operation that markets one-write pegboard accounting systems and loose-leafed forms through a nationwide network of forms distributors and office product dealers.

- The Computer Systems Division (information services unit), with approximately 2,080 employees, provides turnkey systems and associated support services to automobile dealerships and turnkey systems and software products to the medical industry.

- The Automotive Computer Systems and Services unit markets turnkey systems to automobile dealers, as well as computer-related products and support services to automobile manufacturers, distributors, and importers. Client educational services are also provided through this unit.

- The International unit markets Reynolds' products and services outside the U.S. This unit includes the operations of Beri S.A. (acquired from Peugeot in August 1987), a provider of processing services and systems to automobile dealers in France.

- Medical Systems, with approximately 260 employees, offers turnkey systems for medical practice management to physician practices.

    - National Medical Computer Services, Inc. (acquired in December 1986) is a wholly owned subsidiary that offers computer systems primarily to hospital-based physicians such as radiologists, anesthesiologists, and pathologists.

- Reyna Financial Corporation is wholly owned financial subsidiary that provides lease financing for products marketed by the Computer Systems Division. During fiscal 1989, Reynolds implemented a change in its accounting procedures and now consolidates Reyna's financials with those of Reynolds. Results prior to fiscal 1989 have been restated to reflect the accounting change.

Total fiscal 1989 revenue reached $602.1 million, a 2% decrease from fiscal 1988 revenue of $613.9 million.

- After eliminating $21.8 million in fiscal 1988 sales from divested non-strategic operations, revenue from continuing operations actually increased 2% during fiscal 1989.

- Net income rose 4%, from $26.1 million in fiscal 1988 to nearly $27.2 million in fiscal 1989. Excluding the $8 million positive effect of an accounting change in fiscal 1988, net income for fiscal 1989 increased 51% over fiscal 1988 levels.

- In the five-year summary that follows, financials have been restated to reflect the adoption of SFAS No. 94 (Accounting for All Majority-Owned Subsidiaries) and the consolidation of Reyna's results with those of Reynolds:

REYNOLDS AND REYNOLDS COMPANY
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	9/89	9/88	9/87	9/86	9/85
Revenue	$602,146	$613,947	$573,861	$414,979	$333,785
• Percent increase from previous year	(2%)	7%	38%	24%	N/A
Income before taxes	$46,102	$29,496 (a)	$40,686 (a)	$43,632	$39,105
• Percent increase (decrease) from previous year	56%	(28%)	(7%)	12%	N/A
Net income	$27,244	$26,092 (b)	$21,221	$23,856	$21,072
• Percent increase (decrease) from previous year	4%	23%	(11%)	13%	23%
Earnings per share	$2.53	$2.43 (b)	$1.91	$2.44	$2.24
• Percent increase (decrease) from previous year	4%	27%	(22%)	9%	24%

(a) Includes gains on the sale of assets of approximately $9 million in fiscal 1988 and $2.3 million in fiscal 1987.

(b) Includes an $8 million or $0.75 per share positive effect of revaluing deferred income taxes.

A five-year financial summary by business segment, excluding the results of Reyna, follows:

REYNOLDS AND REYNOLDS COMPANY
FIVE-YEAR SUMMARY BY BUSINESS SEGMENT
($ thousands)

	FISCAL YEAR				
ITEM	9/89	9/88	9/87	9/86	9/85
Computer Systems Products					
• Revenue	$240,553	$248,009	$229,725	$201,898	$188,598
• Operating income (loss)	$29,501	$(107)	$14,709	$18,893	$14,941
Business Forms					
• Revenue	$348,907	$352,102	$332,975	$202,113	$136,739
• Operating income	$19,559	$26,047	$26,307	$23,979	$19,742

Computer Systems products and services revenue increased 5% to $240.5 million in fiscal 1989, after eliminating $19.4 million of fiscal 1988 sales from non-strategic businesses sold during 1988.

- The increase was primarily the result of increases in-house computer system sales for dealerships, maintenance and support revenues, and medical computer systems sales.

- In-house dealership systems sales increased primarily as a result of increased volume of higher-priced ERA systems. While the number of VIM/NET[R] systems sold increased, VIM/NET revenues decreased because of lower average system prices. Lower system prices resulted from the conversion of batch data processing customers to lower-end in-house systems as the U.S. batch operations were closed.

- Software support revenue grew rapidly because of the higher number of software applications sold with ERA systems and the high number of VIM/NET systems sold.

- Medical computer systems sales increased 23% during fiscal 1989.

Significant activities during fiscal 1989 include the following:

- Reynolds sold a record number of ERA[R] in-house systems for automobile dealers

- The company added Volvo, Jeep/Eagle, Mercedes-Benz, and Nissan to the growing number of automobile manufacturers that used Reynolds electronic parts cataloging systems.

- Reynolds signed a $25 million, three-year contract with Insurance Services Office, Inc. for business forms and forms management services, as well as similar multi-million dollar contracts with General Dynamics and General Electric.

- Reynolds developed and implemented a plan for General Printing which consolidated manufacturing facilities, upgraded equipment, and installed systems to improve productivity reduce costs, and respond to customer needs.

- During the year, the profitability and market position of National Medical Computer Services was significantly improved.

- Gains were made in the in-house automotive systems market in France.

- Reynolds increased productivity company wide, while reducing selling, general, and administrative costs by $17.8 million from fiscal 1988 levels.

Key Products and Services

The majority of Reynold's fiscal 1989 Computer Systems revenue was derived from turnkey systems and associated support services provided to automobile dealerships and medical practices. A small percentage was derived from software for medical practices.

Reynolds has installed more than 17,000 turnkey systems in dealerships. The company's current product line, the ERA^{R} computer system, introduced in early 1987, is based on a Motorola 68020 32-bit microprocessor.

- ERA provides totally integrated data base applications for sales, parts, service, and business office departments.

- Reynolds currently offers two ERA systems:

  - ERA 96000 is designed for multi-franchise, multi-store dealer corporations and megadealerships requiring 200 or more workstations.

  - ERA 48000 is targeted to dealers requiring from as few as 8 user workstations to as many as 48 workstations.

Reynolds also continues to market and support the VIM/NET^{R}5 product line which is based on the NCR Tower minicomputer.

- The systems provide auto dealers with applications for accounting, payroll, inventory management, invoicing, service merchandising, vehicle merchandising, and leasing functions.

- All VIM/NET 5 computers can be linked through a local area network to share and access data for total dealership integration.

- VIM/NET 5 systems include the following:

  - VIM/NET 5, Model 2024 is targeted to small dealerships entering into in-house computing or as an addition to an expanding system. The system can support one to eight terminal ports.

  - VIM/NET 5, Model 24000 is targeted to medium-sized dealerships requiring more disk space and up to 24 user workstations.

  - VIM/NET 5, Model 48000, targeted to very large dealerships, can operate up to 48 workstations as a standalone system or 128 workstations in a networked configuration.

Reynolds also offers the following products to dealerships:

- The executive Data Management System, introduced in 1986, is a software product that permits preformatted and custom report generation and interfaces to off-the-shelf software packages for spreadsheet, word processing, data management, and financial analysis capabilities.

- Reynolds markets Bell and Howell's IDB2000 electronic parts catalog to auto dealers nationwide under the name PartsVision® electronic parts catalog system. The catalog currently stores 10 years of parts diagrams and text on magnetic and/or CD-ROM disks for General Motors dealers in the U.S. and Canada. Similar systems for Chrysler dealers (called "PAIS"), Jeep Eagle, Mercedes-Benz, and Honda/Acura dealers are also available.

Reynolds' Manufacturer Services Group (within the Automotive Computer Systems and Services unit) was established in early 1986 to provide products and services directly to automobile manufacturers, importers, and distributors.

- Reynolds provides the standalone Dealer Communications System (DCS), which includes a unique communications processor for direct communications between auto dealers and manufacturers.

  - Reynolds was named exclusive supplier of dealer communications systems for Isuzu and Saab dealers.

  - Reynolds announced the availability of a system to provide Chevrolet dealers with direct access to Chevrolet's Total Information Management System (TIMS).

  - Reynolds announced a new DCS for Hyundai and Subaru dealers.

  - Reynolds announced the industry's first "partial" DCS approved by General Motors, Ford, and Isuzu.

  - Reynolds provides manufacturers with support services, including training and education, hardware installation, maintenance, and software services.

Turnkey system service and support is provided by approximately 650 service personnel located in four regional and 84 local service offices. Regional educational centers provide specialized customer training, advanced seminars in accounting and parts and service merchandising, and executive and management information seminars.

Products/services provided to the medical industry include the following:

- The Medical Practice Management System (MPMS), announced in 1984, is an NCR Tower-based turnkey system targeted to office-based group practices. System features include automatic preparation of insurance forms and fee slips, complete accounts receivable aging, and management reporting.

- Through National Medical Computer Services, Reynolds provides the following application software products:

  - Physician's Account Receivable (PAR) is a billing and accounts receivable management system for hospital-based physician groups and billing service bureaus. PAR operates on IBM AS/400 and System/36 computers.

  - The PAR/PM (Physician's Accounts Receivable and Practice Management) system is designed for office-based physician groups. In addition to performing billing and accounts receivable management functions, PAR/PM offers other practice management features such as patient appointment scheduling and medical history recordkeeping. PAR/PM operates on the IBM AS/400.

  - The Automated Radiology Management (ARM) system automates the administrative, film archiving, and clerical tasks performed by free-standing diagnostic imaging centers and hospital radiology departments. ARM operates on the IBM PS/2, Model 80, but can interface with the PAR system and hospital information systems.

  - National Medical Computer Services has installed nearly 1,400 systems and has a current customer base of 1,000.

Reynolds sells computers/terminals/peripherals manufactured by IBM, NCR, Texas Instruments, and Televideo.

Industry Markets

The majority of Reynolds' Computer Systems revenue is derived from automotive dealerships and automobile manufacturers. The remainder of revenue is derived from medical practices.

Auto manufacturing clients include Chrysler, General Motors, Ford/Lincoln Mercury, Mercedes-Benz, Nissan, Honda/Acura, Volvo, Saab, and Isuzu.

Geographic Markets

Approximately 89% of Reynolds' fiscal 1989 revenue was derived from the U.S. and 11% from its foreign subsidiaries.

Foreign subsidiaries' net sales and net income were $68.2 million and $2.5 million in fiscal 1989, compared to $61.8 million and $2.9 million in fiscal 1988, and $38.3 million and $383,000 in fiscal 1987, respectively.

Reynolds operates nearly 200 sales offices worldwide. International subsidiaries are located in Canada, France, and Australia.

Computer Hardware

Reynolds uses equipment from various manufacturers, including IBM, NCR, Televideo, Texas Instruments, and Bell and Howell in support of its processing services.

COMPANY PROFILE

SPEECH PLUS, INC.
P.O. Box 3703
1293 Anvilwood Avenue
Sunnyvale, CA 94088
(408) 745-1818

Peter L. Lloyd, President
Private Company
Total Employees: 40
Total Revenue, Fiscal Year End
12/31/88: $6,000,000*

*INPUT estimate

The Company

Speech Plus is a leading independent manufacturer and marketer of voice processing products based on synthesized-speech technology.

- Its products include both the more common digitized (stored voice) capability (recorded vocabulary) and its proprietary text-to-speech conversion capability (speech synthesis) for "speaking" any computer-resident information over the telephone to authorized callers.

- The products are used in voice response applications that speak data base information over the telephone, record voice replies left by the callers, store responses entered using the telephone key pad, and make outbound calls to deliver critical information based on conditions and telephone numbers defined in the application.

The company started as a division of Telesensory Systems, Inc. As part of Telesensory Systems, the company introduced its first product, the stored voice Speech 1000 series for the industrial market.

- Its Prose 2000 text-to-speech board-level product for the industrial market was introduced in 1982.

- In 1983, Speech Plus, Inc., was founded to develop ard market voice output technology for information processing applications. Initial license agreements were established with Texas Instruments and Wang.

- In 1984 Speech Plus introduced its CallText family of board and system products, which feature text-to-speech and telephony technology.

- In 1985, Speech Plus licensed its proprietary technology to IBM for use in its Personal Computer Voice Communication Option and by Olivetti. In 1986 a licensing agreement was established with Hewlett-Packard.

- In 1987, Speech Plus was awarded two patents for its CallText architecture. The patents cover speech synthesis in voice response systems using terminal emulation as a means of connecting to and retrieving information from host computers. Another patent is in process. This patent covers the methodology used in the speech synthesis technology.

- In 1988, Speech Plus introduced its CallText Voice Gateway Systems product line, including the multivoice technology Vas and the entry level Vas/dv, which uses digitized voice for simpler applications.

Venture capital investors in Speech Plus, Inc., include: Westinghouse Electric Corp.; Continental Capital Ventures; Lexington Venture Partners; Scientific Advances; Ameritech; Northern Telecom, Inc.; Mitsubishi; and Wind Point Partners.

The principal competitor for Speech Plus in speech synthesis technology is Digital Equipment's DecTalk product. Other competition is provided by Berkeley Speech Technologies.

Key Products and Services

The company has two principal product lines: the Prose workstation-based applications (without a telephony function) and the CallText products, which provide for telephony-based applications.

The Prose line includes a 4000 board-level product for use in the IBM PC AT platform environment, the Prose 2000 board for the multibus environment, and the Prose 2020 peripheral, with an RS232 port.

- Principal applications for the Prose product line are for handicapped screen readers, computer-aided instruction, and factory automation quality inspection (hands busy, eyes busy) activities.

The CallText product line includes board products, peripherals, and complete systems used in voice-processing applications.

- The CallText 5000 is a board-level product designed for the IBM PC/AT form factor. This product is sold primarily through OEM and reseller channels.

- The CallText 5050 is a peripheral product that can be configured for minicomputer or microcomputer applications, with 1-4 channel support.

- The principal systems-level product is the CallText Voice Gate System (VGS), a microcomputer-based product.

  - The Vas system was the first to offer both digitized voice and speech synthesis technology in a single platform.

  - A unique capability of the Gateway system is immediate data base access to multiple host computers simultaneously. In addition, menu-drive tools and a high-level script language are available for rapid application development.

  - The sale of the system product with the application development tools could be termed a semiturnkey product delivery. Included in the system sale is product implementation support, installation and a 12-month warranty supported by Nationwide Service through Dow Jones.

  - CallText Voice Gateway System provides direct telephone access to unlimited information (rather than only preselected phrases) stored in local or host computer data bases, including names, addresses, product descriptions, service dispatch instructions, and electronic mail messages. Callers can also leave recorded replies in response to the information received. This system can be an alternative to a computer terminal used for accessing such information remotely.

  - Multiple systems can also be linked together with the company's multinode LAN architecture.

  - Some of the current applications being implemented include E-Mail, order entry, and dispatch.

  - The price of the VGS system starts at $23,500.

The company also provides a standard turnkey systems product based on the Voice Gateway platform. The product includes the following standard applications developed by Speech Plus.

- The Audio News Alert system is a dynamic, real-time system for alerting users to critical and urgent news. It directs tailored, time-sensitive information from news wire services directly to designated users by telephone.

  - With Audio News Alert, users select company names or key words they want to track. When a match occurs, the Audio News Alert system automatically calls the user on the telephone, speaks the headline, and offers to read the rest of the story. After hearing the headline and wire service name, users then decide whether to listen to a portion or the entire story, and/or to have the story printed.

  - The American Stock Exchange is an Audio News Alert customer.

- Audio Email™ allows IBM PROFS or ADR eMAIL users to access their electronic mail messages from any touch-tone phone. Users can access their calendars and also record replies to electronic mail messages received.

- The Automated Toll Investigation™ System automates the CNA Customer Name and Address Bureau and addresses primarily the telephone company market. Instead of operators manually entering inquiries about specific telephone numbers into display terminals, the customer is directed through the process of finding the desired name and address through the use of simple commands and numbers entered through a touch-tone telephone. The information and instructions are delivered to customers through voice response. Customized call and billing statistics are also generated by the system.

A total (turnkey) VGS system configuration consists of a Tandem NonStop computer system and CallText® Vas. A standard TELCO CRS tape is loaded into the Tandem computer, which sorts it into the reverse directory data base. The CallText channels are connected to the Tandem computer by RS-232 ASYNC communication lines.

The other principal voice response technology is digitized voice which involves the recording and digitizing of voice passages. Although digitized voice has a more human sounding voice quality, it is more limited in its applications because of the significantly higher recording costs when the information accessed is highly variable.

Industry Markets

Speech Plus markets its systems-level products though a direct sales force, but also uses distributors and resellers. In particular, the company sells in the international markets (Canada and Australia) through resellers. Its Prose line of workstation-based products and CallText boards and peripherals are sold to OEMs through a telemarketing program.

Principal vertical markets for its Prose product line include: the handicapped market (Stephen Hawking, the well-known English physicist uses a Speech Plus board-level product), factory automation (for "hands busy/eyes busy" quality-control-type applications), and the medical market.

Major OEM customers include: IBM (for its screen reader product), Kurzweil, Intel, AT&T, Olivetti, Telesensory Systems, and Westinghouse.

CallText board-level and systems products are used primarily in the telecommunications, transportation, financial, medical, and insurance (for verifying insurance clients) industry-specific markets as well as in the materials management (order entry) and office automation cross-industry markets.

- CallText products have also been installed in a variety of companies to automate the delivery of information to field service personnel.

The current CallText customer base also includes the American Stock Exchange, Ameritech, Applied Data Research, British Telecom, the Dallas Times Herald, the Houston Chronicle, Illinois Bell, Kodak, Michigan Bell, U.S. West, Xerox, and Northern Telecom.

Industry sources project the voice response market for Speech Plus products to expand at a 40% CAGR.

Geographic Markets

Approximately 90% of Speech Plus' revenue is derived from the U.S. Approximately 10% of total company revenue is derived from the international markets, primarily Canada and Australia. British Telecom is also a major customer.

Sales and support personnel are located in regional offices in New York, Illinois, and California.

TRIAD SYSTEMS CORPORATION
3055 Triad Drive
Livermore, CA 94550
(415) 449-0606

William W. Stevens, Chairman
James R. Porter, President and CEO
Public Corporation, OTC
Total Employees: 1,378
Total Revenue, Fiscal Year End
9/30/88: $127,410,000

The Company

Triad Systems Corporation, founded in 1972, develops, manufactures, markets, and supports turnkey systems in three vertical markets: the automotive parts aftermarket, retail hardgoods dealers, and dentists. The company also provides automotive parts pricing and catalog updating data base services.

- Triad also provides lease financing to many of its turnkey system clients through it wholly owned, nonconsolidated subsidiary, TSC Leasing Corporation.

- In June 1987 Triad began providing on-site third-party maintenance services for Altos Computer national value-added resellers and their customers.

Fiscal 1988 revenue reached $127.4 million, a 9% increase over fiscal 1987 revenue of $117.3 million. Net income rose 29%, from approximately $6.4 million in fiscal 1987 to over $8.3 million in fiscal 1988. A five-year financial summary follows:

TRIAD SYSTEMS CORPORATION
FIVE-YEAR FINANCIAL SUMMARY
($ thousands, except per share data)

	FISCAL YEAR				
ITEM	9/88	9/87	9/86	9/85	9/84
Revenue	$127,410	$117,268	$111,676	$107,278	$120,433
• Percent increase (decrease) from previous year	9%	5%	4%	(11%)	33%
Income (loss) before taxes and extraordinary credit	$13,726 (a)	$9,591 (a)	$5,484	$(8,713)	$6,998
• Percent increase (decrease) from previous year	43%	75%	163%	(225%)	161%
Net income (loss)	$8,315	$6,427 (b)	$3,181	$(5,507)	$4,807
• Percent increase (decrease) from previous year	29%	102%	158%	(215%)	124%
Earnings (loss) per share	$0.93	$0.77	$0.41	$(0.74)	$0.66
• Percent increase (decrease) from previous year	21%	88%	155%	(212%)	128%

(a) Includes gains of $297,000 and $590,000 for fiscal 1988 and fiscal 1987, respectively, from the sale of land adjacent to the company's new headquarters facility in Livermore and of its former headquarters in Sunnyvale.

(b) As a result of the gain described above, during fiscal 1987 Triad recognized an income tax benefit from capital loss carryforwards as an extraordinary credit of $509,000. Net income in fiscal 1987 before the extraordinary credit, the gain, and a related effective tax rate benefit was approximately $5.5 million.

Triad management attributes fiscal 1988 results primarily to the following:

- Hardgoods Division revenues rose 15%, or $2.9 million, reflecting a continuing strong demand for the division's products. Triad also benefited from its joint marketing agreement with Cotter & Company, the nation's largest distributor of hardgoods.

- Automotive Division revenues increased 8%, or $3.1 million. During the year international sales improved and warehouse system sales more than doubled to over $1 million due to the release of a new IBM-based product and the sale of two units

during the fourth quarter. Slight increases in domestic sales were attributed to market conditions and competitive pressures.

- Dental Division sales decreased 38%. A lawsuit filed during the year by American Dental Office Systems, Inc. (which was subsequently dismissed) slowed the growth of the dealer network that was begun in late 1987.

- Customer services revenue, reflecting a continued increase in the installed turnkey system base, rose 6%, or $3.3 million.

- Data base information services revenue rose 42%, or $2.2 million, due to a 43% increase in the number of subscribers to the Electronic Catalog data base and a 22% increase in Telepricing revenue.

Product development expenditures, before software capitalization, were approximately $8.1 million (6% of revenue) in fiscal 1988, $7.2 million (6% of revenue) in fiscal 1987, and $8.1 million (7% of revenue) in fiscal 1986. The company capitalized approximately $1.9 million and $1.8 million in software development costs during fiscal 1988 and fiscal 1987, respectively.

Revenue for the three months ending December 31, 1988 was $30.1 million, a 2% increase over $29.6 million for the same period in 1987. Net income for the quarter was $3.2 million, but includes a $4 million gain from the sale of land.

In October 1988, Volt Information Sciences, Inc. reportedly acquired a 12.8% stake in Triad Systems.

Triad is currently organized into five divisions, as follows:

- The Automotive Division markets turnkey systems to the automotive parts aftermarket, which includes warehouse distributors, wholesalers (jobbers) and retailers, and auto repair shops. The company currently has over 5,900 Automotive Division customers.

- The Information Services Division provides two proprietary data bases to Triad's Automotive Division customers for automotive parts pricing and catalog updating. Approximately 2,150 of the company's automotive customers subscribe to one of more of these services.

- The Hardgoods Division markets turnkey systems to hardware stores and home centers, the lumber/building materials market,

decorating retailers, and garden centers and retail nurseries. The company has over 1,700 systems installed in this market.

- The Dental Division markets turnkey systems to dental practices. Triad currently has over 800 dental systems installed.

- The Customer Services Division provides predelivery and installation services, customer training, and hardware maintenance and software support services to its turnkey system clients. This division also provides third-party maintenance services for Altos Computer's national value-added resellers and their customers.

TSC Leasing Corporation, a wholly owned nonconsolidated subsidiary, purchases Triad systems for lease to third parties under direct financing leases.

- TSC purchased and leased $28.3 million, $25 million, and $24.5 million of Triad equipment during fiscal 1988, 1987, and 1986, respectively.

- Triad's investment in TSC is accounted for by the equity method. Income from TSC was approximately $3.3 million, $3.1 million, and $3.9 million for fiscal 1988, 1987, and 1986, respectively.

Triad has subsidiaries in the U.K., Canada, and Australia that market certain Automotive Division products and services.

As of September 31, 1988, Triad had 1,378 full-time employees, segmented as follows:

Marketing/sales	256
Research and development	119
Field engineers/managers	315
Manufacturing	70
Other	618
	1,378

Key Products and Services

Approximately 51% of Triad's fiscal 1988 revenue was derived from turnkey systems, and 43% was derived from associated maintenance and support services. The remaining 6% of revenue was derived from remote batch processing (parts pricing and catalogue data base updating) services.

A three-year summary of source of revenue by product/service area follows:

TRIAD SYSTEMS CORPORATION
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	9/88		9/87		9/86	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
Turnkey systems (a)						
• Automotive parts systems	$42.3	33%	$39.2	33%	$42.9	38%
• Hardgoods systems	21.4	17%	18.5	16%	15.3	14%
• Dental systems	1.8	1%	3.0	3%	2.9	2%
	$65.5	51%	$60.7	52%	$61.1	54%
Maintenance and support services	$54.4 (b)	43%	$51.1	44%	$46.6	42%
Processing services	$7.3	6%	$5.1	4%	$3.3	3%
Other (c)	$0.2	--	$0.3	--	$0.7	1%
TOTAL	**$127.4**	**100%**	**$117.2**	**100%**	**$111.7**	**100%**

(a) New system sales were approximately $32.9 million, $31.3 million, and $31.9 million for fiscal 1988, 1987, and 1986, respectively. Sales of hardware and software upgrades and add-ons to Triad's installed base were approximately $32.6 million, $29.4 million, and $29.2 million for fiscal 1988, 1987, and 1986, respectively.

(b) Includes $440,000 in third-party maintenance revenue.

(c) Other revenue is attributed primarily to sales of turnkey systems made by the company's Tire Division. Triad ceased actively marketing to independent tire dealers during fiscal 1986 but continues to support its installed base in this market.

As of September 30, 1988, a total of over 9,100 Triad systems had been installed worldwide, compared to a total of 8,600 systems installed as of September 30, 1987.

The automotive parts aftermarket consists of four principal levels of distribution: manufacturers, warehouse distributors, wholesalers (jobbers) and retailers, and auto repair shops. Manufacturers distribute automotive parts through warehouse distributors to wholesalers and retailers who stock and sell the automobile parts used by auto repair shops and the public.

- Historically, Triad's Automotive Division has sold turnkey systems primarily to mid- to large-sized wholesalers. Triad's

installed base of wholesaler customers provides a source of recurring revenue through sales of application software, peripherals, hardware upgrades, data services, and customer support. According to Triad, because of the high level of penetration in this market, the company does not expect any significant growth in revenues from product sales to this market.

- Triad is expanding its market for its new products to include large warehouse distributors, smaller wholesalers, retail chains, and auto repair shops.

Triad currently offers the following products and services to the automotive parts aftermarket:

- The Series 12 product line, successor to Triad's original Series 10 system, was introduced in fiscal 1984. Over 450 smaller warehouse distributors have purchased the Series 12 (or its predecessor).

  - These turnkey systems have been designed for the wholesaler market. Smaller warehouse distributors may also use these systems with specialized application software.

  - Series 12 systems use multiple 8-bit microprocessors, one or more disk storage units, counter/management terminals, and printers for invoicing and reports. The systems are available in several different models to accommodate wholesalers of all sizes.

  - Every system is equipped with standard telecommunications software allowing users to exchange purchase orders and pricing and inventory information with suppliers and, in some cases, customers.

  - The systems are designed for modular growth. Optional applications available include the following:

    - Basic Inventory Management: Inventory management reporting, replenishment ordering, item sales history, on-hand balances, and purchase order control.

    - Advanced Inventory Management: Stock level calculation, popularity sales ranking, price labels, price lists, goal planning, and cash flow analysis.

    - Invoice Printing: Point-of-sale and order entry.

- Sales and Core Analysis.
- Accounts Receivable.
- General Ledger.
- Accounts Payable.
- Multi-Store.
- Centralized Accounts Receivable.
- TRANSNET: Automatic order transmission capability directly to the manufacturer via General Electric Information Services Company's networks.

- Series 12 wholesaler systems generally range in price from $13,000 to $100,000.

- The Series 80 Warehouse Distributor System, introduced in 1980, was designed for larger warehouse operations.

  - Over 60 Series 80 systems are currently installed. In late fiscal 1985, Triad experienced reliability problems with the Series 80. These problems significantly reduced sales of warehouse systems during fiscal 1985 and also contributed, together with other market factors, to reduced sales in fiscal 1986.

  - During fiscal 1988, Triad released a new IBM 9370-based warehouse system to replace the Series 80 product. The new system supports information retrieval and has the potential for a larger number of application enhancements. Pricing ranges from $220,000 to $1 million. Two systems were sold in 1988.

- Triad offers two proprietary remote batch data base services to its wholesaler and retailer customers as follows:

  - Telepricing is a data base that provides automatic price updates for automotive parts upon a manufacturer's price change.

    - Telepricing services are available via remote batch or magnetic tape.
    - Telepricing customers pay an initial license fee and a monthly subscription fee ranging from $55 to $265.

  - There are currently approximately 2,200 Telepricing subscribers.

- Electronic Catalog is a data base that includes over 1.3 million parts and prices and can provide over 6.9 million automobile parts applications tailored to a wholesaler's inventory.

  - For a given automotive repair, Electronic Catalog identifies all the parts required together with prices and inventory levels and prompts the wholesaler to recommend related parts that the customer may need in addition to the part requested.

  - Triad charges a license fee and a monthly subscription fee averaging $180 for this data base and provides the customer with periodic updates.

  - Electronic Catalog customers are required to subscribe to Telepricing to update the pricing information in the Electronic Catalog data base, unless the customer has access to an automatic pricing service provided by a Triad national account.

  - Electronic Catalog is available for Series 12 hardware. Series 10 users can purchase hardware upgrades to Series 12 systems or can install LaserCat, Triad's new CD-ROM technology, to access the Electronic Catalog.

  - As of September 30, 1988, approximately 1,900 customers had purchased Electronic Catalog.

- In June 1987, Triad introduced TelePart, a terminal-based system that allows an auto repair shop to order automobile parts electronically by communicating directly with a wholesaler's Triad system.

  - The repair shop can access the wholesaler's Triad system to use the Electronic Catalog to check the availability and list price of parts prior to ordering.

  - Triad markets these terminals to auto repair shops through its wholesaler customers.

  - As of September 1988, over 1,100 TelePart terminals were installed.

Triad's Hardgoods Division markets turnkey systems to hardware stores and home centers, the lumber/building materials market, decorating retailers, and garden centers and retail nurseries.

- The systems are based on Triad-manufactured minicomputers that incorporate 16-bit microprocessors.

- Applications available include:

  - Point-of-sale.
  - Inventory management.
  - Pricing.
  - Purchasing.
  - Receiving.
  - Sales analysis.
  - Accounting.

- Hardgoods systems range in price from $13,000 to $100,000. The average store system costs approximately $36,000.

- There are currently over 1,700 systems installed.

- In order to facilitate marketing to potential customers, Triad has developed national account relationships with large hardware cooperatives, distributors, and associations to promote the benefits of Triad systems to their retail customers/affiliates. Three of the nation's largest buying cooperatives, Cotter & Company (with 8,000 True Value Hardware and V & S Variety store members), Hardware Wholesalers Inc., and American Hardware, have endorsed Triad systems to their members.

  - Triad also has reached a joint marketing agreement with Cotter & Company for its turnkey systems. Cotter & Company also endorsed Triad's TSC lease-financing subsidiary.

Through the Dental Division, Triad markets practice management turnkey systems to dental practices.

- The systems are based on minicomputers and range in price from $7,500 to $35,000, with an average system price of $15,000.

- Applications supported include receivables, billing, appointment scheduling, follow-up reminders, insurance processing, and word processing. During 1988, accounting software and computer-based training functions were added.

- In order to obtain broader industry acceptance for this product line, Triad has solicited endorsements and marketing relationships with major dental associations.

  - Triad entered into marketing agreements with subsidiaries of the California and Texas Dental Associations in 1985 and a subsidiary of the Ohio Dental Association in 1986. Each of these subsidiaries receives compensation for ongoing marketing services and for the endorsements of Triad products.

  - In 1986 Triad signed a joint marketing and endorsement agreement with a subsidiary of the American Dental Association, American Dental Office Systems, Inc. (ADOSI). Triad has virtually completed conversion of ADOSI system users to Triad software.

- There are currently over 800 dental systems installed, including 285 ADOSI systems converted to Triad software.

Triad provides the following services to its clients in conjunction with its turnkey system sales:

- Predelivery services include cost-justification analysis, site planning and preparation, training for management and employees, installation planning, and customer visits to other Triad user sites.

- During fiscal 1986, Triad introduced Zapstart, a service that preloads an individual automotive customer's inventory, pricing, and parts applications data into its Triad system upon installation, saving customers manual data entry time.

  - Hardware retailers that are customers of certain hardware cooperatives or distributors can preload inventory files provided by these cooperatives or distributors.

  - Triad can also deliver a dental system preloaded with the practice's patient files.

- Customer training is available from 32 domestic and four foreign Triad education centers.

  - During fiscal 1988, over 23,000 individuals were trained. Triad also provided training through the sale of over 4,500 video tutorials and 7,300 hours of extended customer education.

- Seminars and workshops are also available.

- Three months of system support are included in the price of a Triad system. Postsale support is available through a System Support Agreement. The services offered include preventive and remedial maintenance, hardware engineering modifications, and software enhancements.

  - Field engineers and managers work out of 127 domestic and 18 foreign field service offices.

  - The monthly fee due under the support agreement varies with system size and averages $500.

  - Triad's Advice Line gives customers telephone access to personnel able to perform on-line diagnostics and dispatch a field engineer if on-site service is necessary.

Industry Markets

Triad derived its fiscal 1988 revenue from the automotive parts aftermarket, retail hardgoods dealers, and dental practices.

Triad markets to the automotive and retail hardgoods industries through its direct sales organization.

The company markets to private dental practices through 22 independent dealer organizations.

Geographic Markets

Approximately 92% of Triad's fiscal 1988 revenue was derived from the U.S. The remaining 8% was derived from Canada, Australia, and the U.K.

A three-year summary of source of revenue follows:

TRIAD SYSTEMS CORPORATION
THREE-YEAR SOURCE OF REVENUE SUMMARY
($ millions)

	FISCAL YEAR					
	9/88		9/87		9/86	
ITEM	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL	REVENUE $	PERCENT OF TOTAL
U.S.	$116.8	92%	$109.7	94%	$103.4	93%
International	10.6	8%	7.6	6%	8.3	7%
TOTAL	**$127.4**	**100%**	**$117.3**	**100%**	**$111.7**	**100%**

Triad has approximately 93 offices located throughout the U.S. in support of sales and marketing, field services, and training.

The company also has offices in Canada, the U.K., and Australia.

Computer Hardware and Software

Triad uses two of its Series 80 systems to update and store pricing data for its telepricing service. The data is transmitted to client Triad systems via telephone lines on a remote batch basis, generally after hours, or by magnetic tape.

Triad has a DEC VAX-11/780 installed at its headquarters for internal accounting functions.

COMPANY PROFILE

VOTAN
4487 Technology Drive
Fremont, CA 94538
(415) 490-7600

John W. Luke, President
Private Company
Total Employees: 40
Total Revenue, Fiscal Year End
12/31/88: $4,000,000*

*INPUT estimate

The Company

Votan, founded in 1979, develops and markets computer-based voice recognition systems.

- After two-and-a-half years of research and development, Votan developed an algorithm and the associated technology for digitization, feature extraction, and voice data compression. In 1981, its first product, a stand-alone speaker dependent recognition system, was introduced.

- In 1982, Votan introduced its second product, a system that incorporated speech dependent recognition and added speech compression for voice response and voice store-and-forward capabilities. This product was typically used by connecting it to an IBM PC or compatible that had overall control of the application.

- In 1983, Votan introduced speaker independent voice recognition in a product that could recognize without training, the words "yes" and "no", and digits 0 through 9.

- In May 1984, Votan implemented a single board architecture incorporating a custom VLSI processor, a design on which all subsequent products were based. In the fall of the same year, the company developed an improved algorithm for speech compression.

- In June 1986, Votan introduced TeleCenter, an IBM XT or AT-based voice-mail system based on the single-board architecture developed in 1984. The TeleCenter was Votan's first turnkey system, marrying voice, computer, and telephony technologies.

Votan is also a market leader in the voice messaging market. Principal competition is from companies such as Octel Communications, Kurtzweil, Applied Intelligence, Dragon Systems, Texas Instruments, NEC, AVT, and Speech Plus.

Key Products and Services

Votan's products are based on proprietary algorithms that perform CSDR (continuous speaker dependent recognition) and compressed digital speech. These mathematical algorithms are incorporated in custom integrated circuits and internally developed microcode.

- The template-based voice recognition technology permits the user to enter data and/or commands to a computer at a speaking pace which is natural (i.e., does not require artificial pauses between words).

  - In environments with high-level background noise, user-reported accuracy is typically greater than 98%.

  - In addition, the Votan technology operates effectively over normal telephone lines. With speaker dependent technology, large vocabularies can be used, constrained primarily by the size of the computer memory being utilized.

Votan is also an industry pioneer in Speaker Independent Recognition (SIR) technology.

- The stage of development of Votan's SIR technology is on the leading edge within the speech recognition industry.

- Its current technology is incorporated in its Voice Management System product, the VMS 7000. In addition to its SDR (speaker dependent recognition)-based technology capabilities, the VMS 7000 can provide SIR for the words "yes" and "no" and the digits 0 through 9.

- Seeking to expand the capability of such technology, Votan has developed a mathematical model of the human ear, which could greatly expand the state-of-the-art in speaker-independent voice recognition technology. Such systems could be used to allow callers to obtain airline reservations, for data/word entry into personal computer, for entering catalog orders, etc. The market potential is probably significantly greater than that for speaker dependent-based technology.

Votan's current product line consists of the following basic offerings: Board level products and multi-channel system level products.

Votan offers two board level products: VPC 2100 (an IBM PC voice card) and VSP 1000 (a multibus form factor/interface card).

- The VPC 2100 board plugs directly into one slot in any IBM PC/XT/AT or compatible. When installed, the board allows the user to use his or her voice to interact with any off-the-shelf PC software or other PC software that the user has developed.

  - A few of the many applications for the VPC 2100 include quality assurance, remote order entry, telemarketing, voice mail, and executive workstations.

  - The following software products are offered as options with the VPC 2100:

    - VoiceKey is an end user oriented software package that enables users to drive commercial software by voice.

    - The Voice Library is a development tool available to support sophisticated voice dialog applications. This library is a series of modules that can be incorporated into any "C" program. These modules provide full access to all voice functions using high level commands and is ideal for applications requiring extensive data manipulation or communication.

    - The Telephone Professional is software that runs in the background on a PC and allows it to be used as a telephone utility. The software provides voice-activated dialing, message taking and forwarding, and the ability to broadcast a message to a list of people and take a return message from each.

    - The Voice Builder is an application generator that features both voice response and voice recognition. The Voice Builder eases development effort, reduces errors, and shortens implementation time. Applications for Votan's voice input and output products can readily be produced by system developers and end-users, regardless of their level of software sophistication.

- The VSP 1000 contains all of the features of the VPC 2100 but is designed to interface physically and electrically to the multibus environment. The VSP 1000 is typically sold to users who develop their own multibus-based hardware and software.

- Votan's voice processing card product is used primarily in the manufacturing and health care markets, where the company has market leadership positions.

The company's voice messaging products consist of two families of multi-channel voice messaging systems: the VMS 7000 voice management system and Votan TeleCenter. These systems use the capabilities of either the multibus boards or the PC board.

. Votan's Voice Management System, VMS 7000, can run from 4 to 16 independent, interactive, voice dialogues simultaneously.

  - VMS 7000 is a rack-mountable chassis that houses a multibus-compatible backplane. In this chassis are up to 16 VSP 1000 voice cards, a single-board computer based on the Intel 80286 microprocessor, 5 megabytes of RAM, a 5-1/4" floppy disk, and a 5-1/4" hard disk (85 or 140 megabyte). The VMS runs under RMX-286, Intel's multi-tasking operating system.

  - The typical use for a VMS is a telephone-based, voice front end for a larger computer system. Examples are remote sales order entry, remote data base inquiry, voice data services (e.g., 976 number services), or voice mail.

. The Votan TeleCenter voice mail system was introduced in 1986 as a turnkey system based on an IBM PC compatible computer. In 1988, the product's port capacity was enhanced from 4 to 8 ports via an expansion chassis on an IBM PC/AT compatible computer permitting the system to accommodate organizations of up to 500 users.

  - The functions of this PC XT or AT compatible-based turnkey system can be controlled both by DTMF tone input (as is standard with all voice mail systems) and also by voice commands using speaker dependent voice recognition. The Voice Entry feature expands the use of voice recognition by allowing the user to sign on to the system using his voice instead of requiring touch tones. The system also includes the Votan voice cards and Votan's Voice Mail software. It ranges in price from $8,000 to $30,000.

  - Recent enhancements to the TeleCenter include outcalling and auto attendant features. The outcalling feature notifies voice mail users when messages arrive in their voice mailbox. Notification may be to a pager or a telephone. This is particularly useful when the user is busy or unable to take the call. He/she can arrange to have the TeleCenter call back, much like the "snooze" button on an alarm clock.

Industry Markets

The company's products are sold into a variety of vertical markets (finance, manufacturing, medicine, merchandising, aeronautics, aids for the handicapped, and transportation) as well as a number of horizontal/cross-industry markets (data entry and retrieval, remote transaction processing, robotics, and equipment control).

Management has indicated that the company has established the largest base of end users of any voice company--more than 1500.

Customers include Century 21, Norwalk Furniture Co., Kaiser Permanente Health Foundation, Westinghouse Voice Systems, and General Electric Ravenna Lamp Division.

In addition, several major companies, including Westinghouse, Honeywell, Unisys, and SCI Systems, have OEM and/or licensing agreements with Votan.

The principal client base is Fortune 1,000 companies.

Geographic Markets

The company markets throughout the U.S., with regional sales offices on both the East and West coasts and in the Midwest.

The products are also sold internationally through distributors in the U.K., Canada, and Australia.

E

Turnkey Systems Companies' Competitive Advantages and Disadvantages

There are particular advantages and disadvantages to being an independent turnkey system company supplier. These are outlined below:

Computer equipment and systems software vendors, in particular, will increasingly need to utilize independent VARs as part of a comprehensive distribution strategy, for the following reasons:

- Significant market opportunities in industry-specific markets
- Increasing user requirements for packaged as well as customized applications software
- Cost-effective approach for marketing to small and medium-sized business accounts
- Need to provide a total solution strategy to maintain account control

The independent turnkey systems companies have certain competitive advantages in marketing valued-added turnkey solutions compared with the computer system companies:

- Knowledge of local markets
- In-depth knowledge of particular vertical markets
- Easier access and less overhead in marketing to geographic areas and specialized application niches
- Cost competitive in selling lower priced, microcomputer-based product
- Rapport with small business managers
- Flexibility of response
- Current lack of major internal application software product at many computer systems companies which address industry-specific markets
- Customization capabilities
- Account control

These competitive advantages suggest that providing a total (often customized) solution for niche-oriented markets (with a low-overhead, flexible company operating structure that draws upon particular application expertise), can provide a very competitive marketing approach.

However, there are also a number of negative factors (disadvantages) which could inhibit the growth potential of the independent turnkey systems company vendors over the next several years, including:

- Competitive encroachment from computer manufacturers' direct sales organizations
- Increasing competition from professional services and systems integration companies
- Declining hardware margins for the turnkey systems companies related to the more commodity-related nature of standard hardware platforms
- Trend to lower discount rates and higher quotas from hardware vendors
- Frequent lack of a multiregional marketing presence, which can significantly reduce potential market size
- Limited capital resources and difficulty in accessing public markets
- Increasing number of strategic alliances between computer manufacturers and software developers to directly address the vertical, turnkey solution markets
- Lack of seasoned management and strong management controls

In recent years, some of the largest computer systems companies have introduced major new product lines which can be described as turnkey systems products, such as: IBM's SolutionPacs and IBM's AS/400 Office; and DEC's Solution Systems. In addition, certain of the larger systems software vendors have been expanding product and services to provide a total solutions delivery capability.

F

Future Product Opportunities

During the next five years, the product applications listed below should represent above-average growth potential:

- Health care (alternative/home delivery modes)
- Manufacturing (particularly CIM)
- State and local government (including college administrative software)
- Banking and finance (following a near-term slowdown in the brokerage industry)

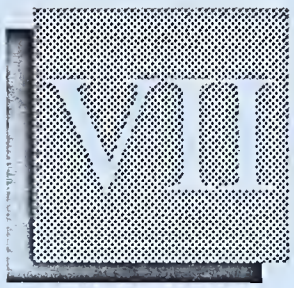
Developments in the following areas will provide opportunities for turnkey systems companies to enhance their products and add value:

- Artificial intelligence—particularly the use of expert systems in decision-based modeling applications or product cost estimation systems

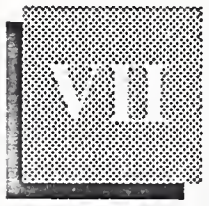
- Network management software, both for LANs as well as inter-LAN corporatewide software
- Open systems interconnect software
- Multiuser software solutions based on UNIX, which can provide portability from PCs to mainframe platforms and more-flexible network solutions
- Network applications software, such as groupware document management and products such as the SQL server, for networked relational data base system access
- Image processing for integration with industry-specific and cross-industry applications

Systems software products that should help strengthen the competitive position of turnkey systems company suppliers include:

- CASE tools to improve programming productivity
- 4GL/RDBMS tools to provide for application portability and enhanced user flexibility
- Application development programs, such as IBM's AD/Cycle, DEC's Network Application Support, and HP's New Wave and similar programming environments to enhance flexibility of software use.



Supporting VARs



Supporting VARs

A

Introduction

The downward migration of processing technology from huge mainframes to small systems has pushed value-added resellers to the forefront as key players in the marketing strategies of information systems vendors. Lower prices and tighter profit margins on small systems have made a direct sales force approach for the small business user segment less cost-effective. More and more vendors are looking at value-added resellers as extensions of their direct sales forces, not only for moving hardware and software products, but for selling the support services that go with them.

High quality vendor support is becoming increasingly important to recruiting and keeping good value-added reseller clients.

As part of INPUT's Customer Support Program (CSP), an analysis was made of VAR support and incentive programs of three vendors, DEC, IBM, and Compaq, all of which have developed different approaches to VAR support.

B

Objectives of VAR Support

The principal objective behind VAR support and incentive programs is to encourage VARs to market the vendors' products and services. The objective is simple enough to state, but the methods to achieve this objective consist of a tangle of choices that could either turn the partnership into a "win-win" situation for both vendor and VAR, or dissolve it into a tense relationship hampered by numerous conflicts.

The vendor's primary objective is to maximize returns by distributing through a wider network of resellers, thereby broadening the potential customer base, without incurring the costs of using a direct sales force. The reseller's similar goals also require the vendor's full backing of its efforts to allow the reseller to deliver the best product and services to its

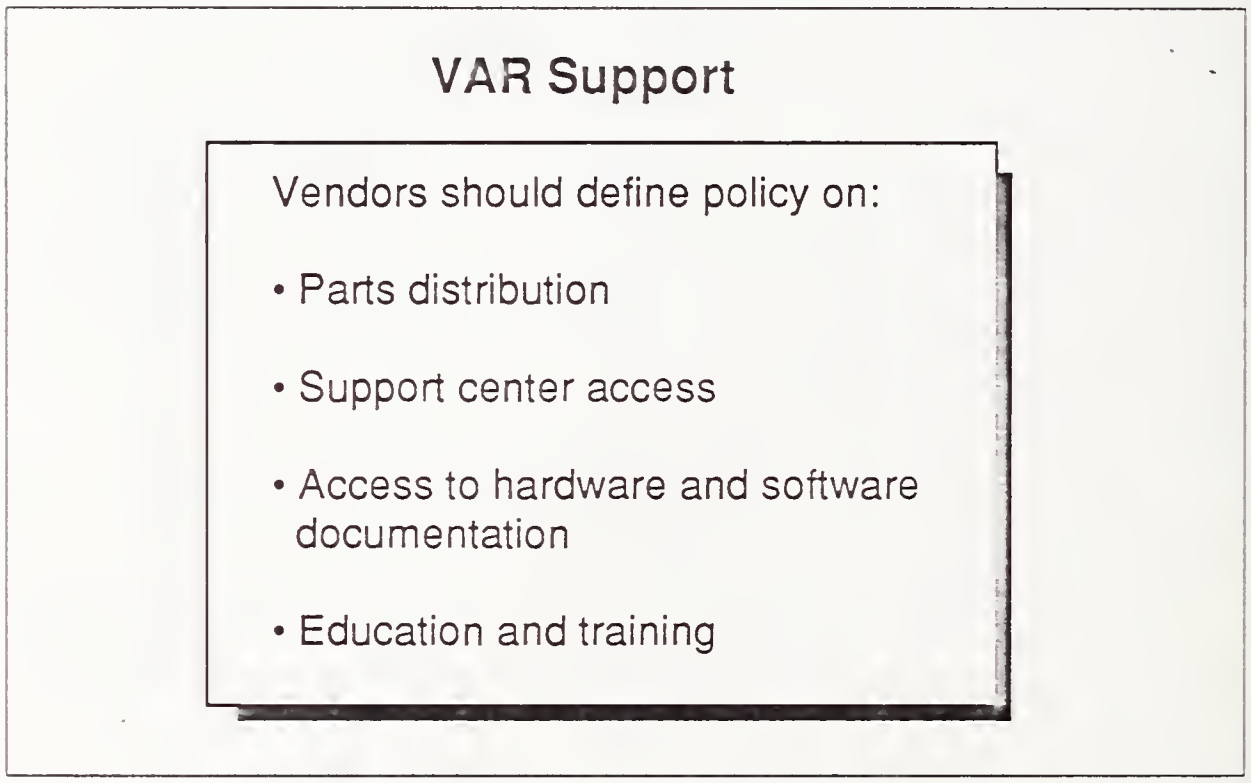
customer, thereby achieving customer satisfaction and repeat business. In some cases, both the vendor and VAR are trying to sell to the same customer. Result: conflict. Channel conflict could, and should, be reduced through more selective partnering strategies and better channel management, but vendors should not withdraw or degrade support to VARs in order to diminish competition. The resellers constitute a pipeline through which customers receive the vendor's product and services, and a degradation of product and service quality to the end user due to poor VAR support reflects badly on both the vendor and VAR. Where, then, can the twain meet?

C

VAR Requirements

In order to provide an adequate level of support to their customers, VARs need defined policies from computer systems manufacturers in four principal areas: parts distribution, maintenance documentation for both hardware and software, priority access to support center expertise, and education and training. See Exhibit VII-1.

EXHIBIT VII-1



1. Parts Distribution

A vendor's parts policy should have the following: a provision allowing VARs to resell overstocked parts back to the vendor, another allowing dealers to purchase parts from local service offices, discounted prices for resellers, and an expedited parts delivery process for resellers willing to foot the shipping fees.

Given the short life-cycle of technical products, dealers are often reluctant to maintain an adequate supply of parts for fear that they will be left holding a high inventory of obsolete parts after the next product cycle. Allowing VARs to resell overstocked parts allows dealers to overcome

these fears. Since parts comprise an ever larger percentage of maintenance costs, providing parts to dealers at a discount allows dealers to make a profit on parts as well as labor. Allowing dealers to purchase parts from local service offices and expediting parts delivery ensures quickly turnaround and eases the parts supply flow. Exhibit VII-2 provides a look at IBM, DEC, and Compaq's competitive stance in the area of parts distribution.

EXHIBIT VII-2

VAR Requirements—Vendor Comparison
Parts Distribution

	Compaq	DEC	IBM
Are dealers allowed to return parts if overstocked?	Yes	N/A	Yes, limited to certain part numbers
What type of parts discounts do you provide to authorized dealers and services?			
Flat	None	None	33%
Volume	No	Yes	None
Are dealers charged extra for fast delivery on parts?	No	Yes	Yes, if not warranty—$25/line item
If "yes", does the charge cover the following?			
Fast Delivery	N/A	Yes	Yes
Same-Day Shipping	N/A	No	Yes

2. Support Center Access

An ongoing exchange of technical information is vital to a VAR's ability to successfully represent a manufacturer. The degree of information and methods of providing it, however, vary widely between hardware vendors and their reseller agents. Exhibits VII-3a through 3c give a detailed overview of the types of information support and delivery exchanged between leading vendors and VARs.

EXHIBIT VII-3a

VAR Requirements—Vendor Comparison
Support Center Access

	Compaq	DEC	IBM
Is technical support hotline centrally located or in several locations?	Central	3 locations in USA	Central
Are specialists immediately accessible or is the dealer usually called back?	Called back	Called back	Called back
Do operators log in the calls and provide status reports?	Yes	Yes	Yes*
How is the success of the hotline measured?	Response time versus objectives	Customer satisfaction survey	Response time, close-out time, customer satisfaction survey
How are tech reps trained?	Formal classroom on each product	Formal hardware and software training, programmed instruction	Formal hardware and software training, self-study courses

* IBM also has an electronic mail system in conjunction with its data base search that allows dealers to log in customers rather than have customers go through the response center operator.
** In 1988, the center logged in 265,000 calls.

EXHIBIT VII-3b

VAR Requirements—Vendor Comparison
Support Center Access

	Compaq	DEC	IBM
Is telephone technical support provided to the following, and is there a separate charge for this support?	Telephone Support/ Charge	Telephone Support/ Charge	Telephone Support/ Charge
Dealers Who Do Not Service	N/A	Yes/No	N/A
Dealers Who Service	Yes/No	N/A	Yes/No
Authorized Servicers	Yes/No	N/A	N/A
End Users	No/N/A	Yes/Yes	No/N/A
Is a response time guaranteed for telephone technical support?	No	No	No*
What is the average response time?	3 minutes	Depends on product and contract	Information not available

* Objective is 80% in less than 2 hours; high priority is 100% in 1 hour.

EXHIBIT VII-3c

VAR Requirements—Vendor Comparison
Support Center Access

	Compaq	DEC	IBM**
How is the following information provided to dealers?	How*/Charge	How*/Charge	How*/Charge
Open Hardware Problems	P***/No	B/No	B/No
Open Software Problems	N/A	B/No	B/No
EC Change Notices (HDW)	P***/No	B/No	B/No
Software Temporary Fixes	N/A	B/No	B/No
Software Updates	N/A	B/No	B/No

* How P—Paper B—Both paper and electronic
E—Electronic C—Call only

** IBM has an electronic dealer bulletin board system that allows data base search. IBM reports that they have not had to make EC changes on PCs and do not have many application software products.

*** Technical bulletins, service advisories

Giving dealers priority access to second level expertise (senior technical support staff) allows them to bypass an unnecessary step in the problem call routing process. Support center staff usually have two levels of expertise: level I staff usually have the task of filtering out user-related errors and simple problems; level II staff tackle the more difficult problems requiring a higher level of expertise. Resellers should, through education and training, be able to handle problems requiring level I expertise. The problems they forward to the vendor's support center, one can assume, would be those requiring senior level expertise. The dealer's direct line to senior technical staff would facilitate quicker turnaround.

If the support center, working with the reseller, is not able to find a resolution to a problem, the vendor should still follow through, either by dispatching field personnel or, if the platform size allows, replacing the system.

3. Maintenance Documentation and Training

In order to encourage dealers to shoulder as much of the support burden as possible, vendors should make available to the resellers the knowledge and training needed to provide support. Hardware and software maintenance documentation should be provided free or sold to VARs. Exhibit VII-4 presents the policies of IBM, DEC, and Compaq in these areas.

EXHIBIT VII-4

VAR Requirements—Vendor Comparison
Documentation and Training

	Compaq	DEC	IBM
Item Required to Certify Others to Service Products	Required/ Separate Charge	Required/ Separate Charge	Required/ Separate Charge
Hardware Training	Yes/No	N/A*	Yes/No (number limited)
Software Training	N/A	N/A	Yes/No
Hardware Documentation	Yes/No	N/A	Yes/No
Software Documentation	N/A	N/A	Yes/No

* DEC does not "authorize" others to perform service

Vendors should also require VARs to train support personnel on the vendors' systems. The vendor can provide these courses either for a fee or can package the education and training component with the system. The latter is preferable simply because resellers are less likely to balk at sending support personnel in for training if direct fees are not involved. The vendor can recover its education and training costs through higher product prices or through special contract arrangements.

D

VAR Incentives

With vendors now using alternate distribution channels to sell maintenance contracts, the issue of VAR compensation for service contract sales comes up. Exhibit VII-5 illustrates the two approaches to compensating VARs.

EXHIBIT VII-5

Approaches to VAR Compensation for Service Contract Sales

Method A: Compensate reseller on a commission basis

- Vendor—Provides service and administrates account
- Reseller—Sells contract only

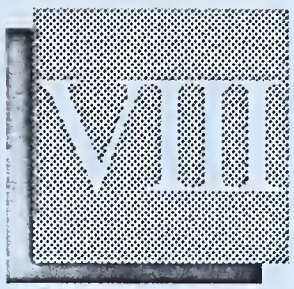
Method B: Sell service contract to reseller at a discount

- Vendor—Sells service contract to reseller at a discount; provides backup support
- Reseller—Resells contract (with or without profit margin); packages contract with its own service and administrates accounts

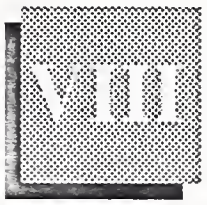
Under Method A, the vendor pays the reseller a straight commission on contract sales. The vendor is responsible for providing maintenance services and administering the account. The reseller takes no part in service delivery or administration.

Under Method B, the vendor sells the service contract to the reseller, who, in turn, resells the contract with or without a profit margin. The reseller may package the vendor's service with its own, and is responsible for screening problem calls and administering the account.

Because resellers in Category B assume more responsibilities, they should be given the opportunity to earn more profit than would those resellers under Category A. Simply said, the discounts offered to resellers operating under Method B should be greater than the commissions offered to resellers operating under Method A. These incentives provide for greater compensation for those resellers assuming more of the support burden; otherwise the VAR, with its own support capabilities, might elect to sell its own service, resulting in lost account control for the vendor.



Conclusions and Recommendations



Conclusions and Recommendations

Survival in the turnkey systems company market involves the ability to generate a strong cash flow to fund new product development and an expansion-oriented marketing effort. Increasingly, survival will require the capability to successfully compete with the new, more formidable turnkey solution marketing efforts of the computer systems vendors, large software houses, and major computer retailers.

For longer-term viability in the turnkey systems company marketing channel, the following approaches are recommended:

- Investigate strategic alliances with leading computer hardware and systems software vendors to leverage marketing capability.
- Seek out niche markets where the turnkey systems company can provide a unique product—with the intent of establishing a dominant market share.
- Become an expert in a niche market for achieving competitive advantage.
- Focus on services such as consulting, systems integration, education/training, and software customization that tie the customer to the turnkey systems vendor.
- Concentrate on marketing to the current customer base to increase productivity of the marketing force. Seek to increase repeat business from a typical 20-25% level to 50-60% range, which also provides a greater sense of vendor stability.
- Increase account control by stressing hardware and software add-ons.
- Work with software development tool vendors who can help provide an efficient means for developing "leading edge" application solutions.

- Stress value-added components from services such as software maintenance, consulting, client education and training, which also provide a steady revenue base and user feedback on new product needs.

- Approach pricing of software products from a value-added perspective.

- Develop a system for measuring the competitive environment and level of market penetration. Possibly work with a consultant.

- Provide growth through a balance of internal software development, VAR product cross-licensing, and acquisitions. Also provide an integrated, modular software product offering, which facilitates purchase of additional modules.

- Improve quality of systems documentation to enhance productivity of the VAR's support systems.

- Develop applications around industry standards and open systems architectures to increase hardware and software flexibility. Also, become familiar with conformance testing consortiums such as X/Open and COS which help assure vendor compatibility to emerging standards such as the various OSI protocol levels.

- Take advantage of new (de facto standard) application development tools, including object-oriented software development tools, to speed the application development process and for portability.

- Emphasize network integration solutions to improve profit margins and increase account control.

- Become a multiregional VAR, possibly through the use of agent/brokers to overcome saturation of local markets.

- Increase content of non-industry-specific application software.

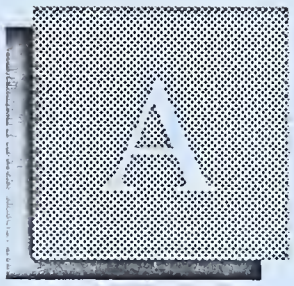
- Stress cost controls, possibly through the use project management software programs.

- Manage receivables to maximize cash flow through use of COD payments, vendor-provided third-party leasing, or factoring of receivables.

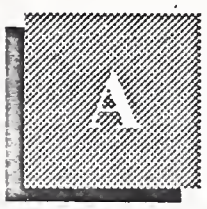
- Minimize inventory carrying costs, possibly by working with Master VARs/distributors.

- Increase emphasis on software product development to provide follow-on products to current customers and for expansion into new, related markets.

- Work with vendors that minimize channel conflict and maximize product support such as training, cooperative advertising, etc.
- Minimize support costs by utilizing remote diagnostics capabilities and 4GL/CASE development tools and by providing user dialup bulletin boards for new product information.
- Avoid an overdependence on the systems supplier for joint marketing to minimize the impact of a possible change in vendor relations.
- Develop user groups to promote feedback on customer product needs as well as to promote customer relations.



Appendix: Definitions



Appendix: Definitions

Information Services - Computer-related services involving one or more of the following:

- Processing of computer/telecommunication-based applications using vendor computers (called "processing services")
- Network-oriented services or functions such as value-added networks, electronic mail, electronic document interchange, on-line data bases, news data bases, videotex
- Products and services that assist users in performing functions on their own computers or vendor computers (called "software products" or "professional services")
- Services that utilize a combination of hardware and software, integrated into a total system (called "turnkey systems" and/or "systems integration")

A

User Expenditures

All user expenditures reported are "available" (i.e., noncaptive, as defined below).

Noncaptive Information Services User Expenditures - Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user

Captive Information Services User Expenditures—Expenditures received from users who are part of the same parent corporation as the vendor

B

Delivery Modes

1. Processing Services

This category includes transaction processing, utility processing, other processing services, and systems operations.

- *Transaction Processing Services* - Updates client-owned data files by entry of specific business activity, such as sales order, inventory receipt, cash disbursement, etc. Transactions may be entered in one of three modes:

  - *Interactive* - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program/files. Computer response is usually measured in seconds or fractions of a second.

  - *Remote Batch* - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

  - *User Site Hardware Services (USHS)* - Those offerings provided by processing services vendors that place programmable hardware at the user's site rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers:

    ° Access to a communications network

    ° Access through the network to the vendor's larger computers

    ° Local management and storage of a data base subset that will service local users via the connection of a data base processor to the network

    ° Significant software as part of the service

  - *Carry-in Batch* - Where users deliver work to a processing services vendor

- *Utility Processing* - Vendor provides access to basic software tools, enabling the users to develop and operate their own problem solutions such as language compilers, assemblers, DBMS, sorts, scientific library routines, and other systems software.

- *"Other" Processing Services* - Include computer output microfilm, laser printing, CD-service preparations, other data output services, scanning and other data entry services, disaster recovery and backup services.

- *Systems Operations (Processing)* - Also referred to as "resource management," facilities management, or "COCO" (contractor-owned, contractor-operated). Systems operation is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. To qualify, the contractor must directly plan, control, operate, and own the facility provided to the user—either on-site, through communications lines, or in a mixed mode. The computer systems/networks used are vendor-owned and operated.

Processing services are further differentiated as follows:

- *Cross-industry* services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

- *Industry-specific* services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Examples of industry-specialty applications are seismic data processing, numerically controlled machine tool software, and demand deposit accounting.

2. Network Services

Network services include a wide variety of network-based functions and operations. Their common thread is that none of these functions could be performed without network involvement. Network services is divided into two major segments: network applications and electronic information systems.

a. Network Applications

The network applications segment is composed of four subsets:

- *Value-Added Networks (VANs)* - VANs typically involve common-carrier network transmission facilities that are augmented with computerized switches. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching

techniques. However, other added data service features, such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing, are of equal importance.

- *Electronic Data Interchange (EDI)* - EDI is the application-to-application electronic communication between organizations, based on established business document standards.

- *Electronic Information Interchange (Electronic Mail [E-Mail])* - Transmission of messages across an electronic mail network managed by a services vendor. This can also include bulletin board services.

- *Other Network Services* - This segment contains videotex and network management services. Videotex is actually more a delivery mode than an application. Its prime focus is on the individual as a consumer or in business. These services provide interactive access to data bases and offer the inquirer the capability to send as well as receive information for such purposes as home shopping, home banking, travel reservations, and more. Network management services included here must involve the vendor's network and network management systems as well as people. People-only functions are included in professional services.

b. Electronic Information Services

Electronic information services are data bases that provide specific terminal-based inquiry such as stock prices, legal precedents, economic indicators, medical diagnosis, airline schedules, current news stories, automobile valuations, etc. Users typically inquire into and extract information from these data bases but do not update them.

The terminals may be computers themselves, such as communications servers or personal computers. The two kinds of electronic information services are:

- Data bases - structured, primarily numerical data on company financial instruments, products, materials, etc.

- News - instructional, primarily textual information on people, companies, events, etc.

3. Software Products

This category includes user purchases of applications and systems software packages for in-house computer systems. Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at users' sites.

Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for

work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself.

There are several subcategories of software products, as indicated below.

a. Applications Software Products

Applications software products perform functions directly related to solving users' business or organizational needs. The products can be:

- *Cross-Industry Products* - Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.

- *Industry-Specific Products* - Used only in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, material resource planning, and insurance claim management.

b. Systems Software Products

Systems software products enable the computer/communications system to perform basic machine-oriented or user interface functions. These products include:

- *System Control Products* - Function during applications program execution to manage the computer system's resources. Examples include operating systems, communication monitors, emulators, spoolers, network control, library control, windowing, and access control.

- *Data Center Management Products* - Used by operations personnel to manage the computer system's resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, utilities, and capacity management.

- *Applications Development Products* - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include traditional programming languages, 4GLs, sorts, productivity aids, assemblers, compilers, data dictionaries, data base management systems, report writers, project control and CASE systems.

4. Turnkey Systems

A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single application (or set of applications) solution. The value added by the vendor is primarily

in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems may be either custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included the appropriate software category.

- Turnkey systems revenue is divided into two categories:

  - *Industry-Specific Systems* - Systems that serve a specific function for a given industry sector, such as automobile dealer parts inventory, medical record keeping, or discrete manufacturing control systems

  - *Cross-Industry Systems* - Systems that provide a specific function that is applicable to a wide range of industry sectors, such as financial planning systems, payroll systems, or personnel management systems

- Revenue includes hardware, software, and support functions.

5. Systems Integration (SI)

Systems integration is a business offering that provides a complete solution to a complex information system, networking or automation requirement through the custom selection and implementation of a variety of information products and services.

A systems integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function and performance on schedule and at the contracted price.

The systems integrator will perform, or manage others who perform, most or all of the following functions:

- Program management, including subcontractor management
- Needs analysis
- Specification development
- Conceptual and detailed system design and architecture
- System component selection, modification, integration and customization
- Custom software design and development
- Custom hardware design and development
- Systems implementation, cutover, test, and evaluation
- Life cycle support including:
  - System documentation and user training

- Systems operations during development
- Systems maintenance

- Financing

6. Professional Services

This category includes consulting, education and training, software development, and systems operations as defined below.

- *Software Development* - Development of a software system on a custom basis. It includes one or more of the following: user requirements definition, system design, contract programming, or documentation.

- *Education and Training* - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance.

- *Consulting Services* - Information systems and/or services management consulting, project assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.

- *Systems Operations (Professional Services)* - This is a counterpart to systems operations (processing services) except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's systems.

C

Equipment/Computer Systems

1. Equipment

Equipment includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals* - Includes all input, output, communications, and storage devices (other than main memory) that can be connected locally to the main processor and generally cannot be included in other categories such as terminals

- *Input Devices* - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters

- *Output Devices* - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters

- *Communication Devices* - Includes modems, encryption equipment, special interfaces, and error control

- *Storage Devices* - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories

- *Terminals* - Three types of terminals are described below:

  - *User-Programmable* - Also called intelligent terminals, including:

    ° Single-station or standalone
    ° Multistation shared processor
    ° Teleprinter
    ° Remote batch

  - *User Nonprogrammable*

    ° Single-station
    ° Multistation shared processor
    ° Teleprinter

  - *Limited Function* - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications

2. Computer Systems

Computer systems include all processors from microcomputers to supercomputers. Computer systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices.

- *Microcomputer [personal computer] (Price below $15,000)* - Combines all of the CPU, memory, and peripheral functions of an 8-, 16-, 32 bit computer on a chip in the form of:

  - Integrated circuit package
  - Plug-in board with more memory and peripheral circuits
  - Console including keyboard and interfacing connectors
  - Personal computer with at least one external storage device directly addressable by the CPU

- *Workstation (Price between $10,000 and $100,000)* - An integrated multifunctional workstation capable of routine higher-speed communications with mini and mainframe computers and of performing complex local processing. Though similar to microcomputers, workstations typically have high-performance 16- or 32-bit architectures, plus greater graphics and integrated communications capabilities.

- *Minicomputer (Price between $15,000 and $350,000)* - Usually a 16- or 32-bit computer. May represent a portion of a larger system or a complete standalone system by itself.

  - Small business computer
  - Small laboratory computer
  - Nodal computer in a distributed data network, remote data collection network, or connected network, or connected to remote microcomputers

- *Mainframe (Price above $350,000)* - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general-purpose computer.

- *Supercomputer* - High-powered processors with numerical processing throughout that is significantly greater than the fastest general-purpose computers, with capacities in the vicinity of 10-50 million floating point operations per second (MFLOPS). Supercomputers fit in one of two categories:

  - *Real Time* - Generally used for signal processing in military applications.
  - *Non-Real Time* - For scientific use in one of three configurations:

    ° Parallel processor
    ° Pipeline processor
    ° Vector processor

- *Embedded Computer* - Dedicated computer system designed and implemented as an integral part of a device such as an automobile, machine tool, weapon, weapon system, or platform; limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from microcomputers to parallel processor computer systems.

D

Telecommunications

1. Networks

Networks are the electronic interconnections between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways:

- *Common Carrier Network* - A public access network, such as provided by AT&T, consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud

- *Value-Added Network (VAN)* - (See listing under Section B.2, Delivery Modes.)

- *Local-Area Network (LAN)* - Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Uses one of two signaling methods:

  - *Basebard* - Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.

  - *Broadband* - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:

    ° Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing)

    ° Multiple (time-sequenced) channels via TDM (Time Division Multiplexing)

    ° High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media)

2. Transmission Facilities

Transmission facilities include wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes, depending on the vendor and the distribution of the network.

- *Mode* - may be either:

  - *Analog* - Transmission or signal with continuous-waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems

  - *Digital* - Transmission or signal using discontinuous, discrete quantities to represent data, which may be voice, data, record, video, or text, in binary form

- *Media* - May be any of the following:

  - *Wire* - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair), to four-wire full-duplex balanced lines

  - *Carrier* - A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity

  - *Coaxial Cable* - A cable used in HF (high-frequency) and VHF (very high frequency), single-frequency, or carrier-based systems; requires frequent reamplification (repeaters) to carry the signal any distance

  - *Microwave* - UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission; also capable of wide frequency channels

  - *Optical Fiber* - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications

  - *Communications Satellites* - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation

  - *Cellular Radio* - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units. Each radio serves a small area called a cell. The computer switches service connections to the mobile unit from cell to cell.

E

Other Considerations

When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user's viewpoint. Expenditures are then categorized according to what users perceive they are buying.

The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, or transportation.

The specific industries (and their SIC codes) included under these generic industry sectors are detailed in the exhibit.

EXHIBIT A-1

Industry Sector Definitions

Industry Sector	Industry SIC	Industry Name
Discrete Manufacturing	23	Apparel Manufacturing
	25	Furniture Manufacturing
	27	Printing, Publishing
	31	Leather
	34	Fabricated Metal
	35	Machinery/Computer Equipment
	36	Electronic Equipment
	37	Transportation Equipment
	38	Scientific and Control Instruments
	39	Miscellaneous Manufacturing
Process Manufacturing	10	Metal Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	14	Mining/Quarrying of Non-Metallic Minerals, except Fuels
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
	33	Primary Metals
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air Transportation
	46	Pipelines
	47	Transportation Services

EXHIBIT A-1 (Cont.)

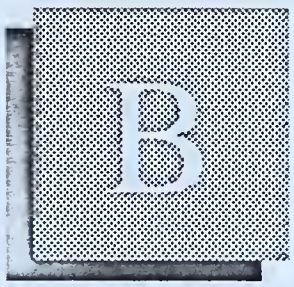
Industry Sector Definitions

Industry Sector	Industry SIC	Industry Name
Utilities	49	Electric, Gas, and Sanitary
Communications	48	Telephone Communications, Radio and TV Broadcasting, Cable and Other Pay Television Services, Communications Services
Wholesale Distribution	50	Durable Goods
	51	Nondurable Goods
Retail Distribution	52	Building Materials, Hardware
	53	General Merchandise
	54	Food Stores
	55	Automotive and Gas Stations
	56	Apparel Distribution
	57	Furniture Distribution
	58	Eating and Drinking
	59	Miscellaneous Retail
Banking and Finance	60	Banks, Thrifts, and Credit Unions
	61	Non-depository Credit, Mortgage Banking
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance Carriers (Life, Health, etc.)
	64	Insurance Brokers and Agents
Medical	80	Health Services
Education	82	Educational Services

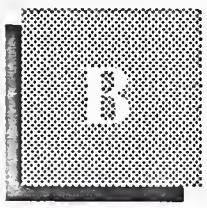
EXHIBIT A-1 (Cont.)

Industry Sector Definitions

Industry Sector	Industry SIC	Industry Name
Services	65	Real Estate Operators, Owners, Lessors, Agents, and Brokers
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	72	Personal Services
	73	Business Services
	75	Automotive Repair, Services, and Parking
	76	Miscellaneous Repair Services
	78	Motion Pictures
	79	Amusement and Recreation Services
	80	Health Services
	81	Legal Services
	83	Social Services
	84	Museums, Art Galleries, and Botanical and Zoological Gardens
	86	Membership Organizations
	87	Engineering, Accounting, Research, Management, and Related Services
	88	Private Households
	89	Miscellaneous Services
Other Industries	01-09	Agriculture, Forestry, And Fishing
	15-17	Construction
Federal Government	N/A	As Appropriate
State And Local Government	N/A	As Appropriate



Appendix: Turnkey Systems Companies Data Base

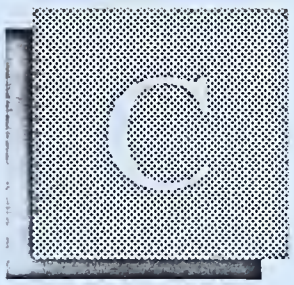


Appendix: Turnkey Systems Companies Data Base

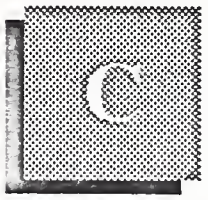
EXHIBIT B-1

Turnkey Systems Companies by Industry Sector, 1989-1994
($ Millions)

Delivery Mode	1988	Growth 88-89 (%)	1989	1990	1991	1992	1993	1994	CAGR 89-94 (%)
Total Turnkey Systems Industry	9,620	11	10,704	11,678	12,788	13,985	15,325	16,821	10
Discrete Manufacturing	2,000	12	2,240	2,464	2,710	2,981	3,279	3,608	10
Process Manufacturing	405	14	465	510	570	635	715	800	12
Transportation	160	10	175	193	212	233	256	284	10
Utilities	35	10	38	42	47	51	56	62	10
Telecommunications	270	18	319	364	415	473	539	614	14
Wholesale Distribution	365	14	416	458	503	554	609	670	10
Retail Distribution	635	12	711	775	845	921	1,004	1,095	9
Banking & Finance	780	11	865	952	1,047	1,151	1,266	1,393	10
Insurance	230	18	271	300	330	360	400	440	10
Medical	775	11	860	945	1,035	1,135	1,250	1,395	10
Education	180	9	196	196	229	247	267	288	8
Services	450	12	504	554	610	671	738	812	10
Federal Government	390	6	413	426	439	452	465	479	3
State & Local Government	120	12	134	151	169	189	211	237	12
Other Industry Sector	345	11	380	417	459	505	556	615	10
Total Industry Sectors	7,140	12	7,989	8,747	9,620	10,558	11,611	12,792	10
Cross-Industry Sector									
Accounting	400	3	412	424	437	450	464	478	3
Education & Training	150	7	160	167	174	181	188	197	4
Engineering & Scientific	330	14	376	421	472	528	592	663	12
Human Resources	110	7	118	124	130	136	143	150	5
Office Systems	850	13	961	1,067	1,184	1,314	1,459	1,619	11
Planning & Analysis	270	5	284	292	301	310	319	329	3
Other Cross-Industry Sector	370	9	403	436	470	508	549	593	8
Total Cross-Industry Sectors	2,480	9	2,715	2,931	3,168	3,427	3,714	4,029	8



Appendix: Turnkey Systems Market Data Base Reconciliation



Appendix: Turnkey Systems Market Data Base Reconciliation

This appendix contains the following information:

- Exhibit C-1, which includes the changes made in this year's forecast as compared to last year's
- An explanation of any significant changes that were made to the forecasts

The growth rate projection for the overall turnkey systems market in 1988 and 1989 INPUT forecasts remains the same.

INPUT's 1988 Process Manufacturing Sector report showed turnkey systems expenditures of $1,140 million in 1988 for the process manufacturing industry. Approximately $735 million of the total represented plant floor supervisory control systems expenditures. In the current data base for this annual turnkey systems report, the supervisory controls market segment has been deducted to make the turnkey systems market data base consistent with the definition used for turnkey systems in the discrete manufacturing and the utilities market sectors. In the 1990 analysis of the turnkey systems market, the supervisory control systems market for all three industry sectors is measured and included in the report.

The 1988 medical market was increased based on the identification of additional turnkey system medical market vendors.

The education and training, and engineering and scientific markets have also shown stronger growth than anticipated in the 1988 forecast, reflecting the strong requirements for job skill retraining and the strength in research and development expenditures. The higher growth rate in the engineering and scientific market is expected to continue, based on the need to emphasize R&D spending in an increasingly worldwide competitive environment. However, the market opportunities for education and

training products and services are expected to shift more to the software delivery mode, due to the increasing sophistication in desktop-based and multimedia software development tools which address the education and training market.

EXHIBIT C-1a

Turnkey Systems— Data Base Reconciliation of Market Forecast by Industry-Specific and Cross-Industry Markets

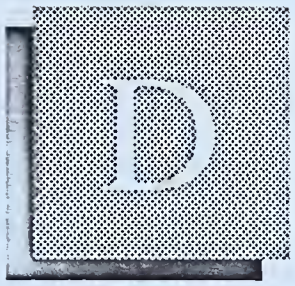
Delivery Mode	1988 Market			1993 Market		1988-1993 CAGR Fcst. in 1988 Rpt. (%)	1989-1994 CAGR Fcst. in 1989 Rpt. (%)
	1988 Fcst. ($ M)	1989 Rpt. ($ M)	Variance as Percent of 1989 Rpt.	1988 Fcst. ($ M)	1989 Rpt. ($ M)		
Discrete Manufacturing	2,000	2,000	-	2,990	3,280	8	10
Process Manufacturing	400	405	+1	630	715	9	12
Transportation	160	160	-	255	255	10	10
Utilities	30	35	+14	55	55	10	10
Telecommunications	270	270	(1)	530	540	14	14
Distribution (Retail)	630	635	+1	990	1,005	9	9
Wholesale Distribution	365	365	-	625	610	11	10
Banking and Finance	780	780	-	1,280	1,265	10	10
Insurance	230	230	-	345	400	8	10
Medical	665	775	+14	1,145	1,250	11	10
Education	185	180	(2)	285	265	9	8
Services	450	450	-	770	740	11	10
Federal Government	390	390	-	555	465	7	3
State & Local Government	125	120	(3)	220	210	12	12
Other Industry-Specific	345	345	-	540	555	9	10
Total Vertical Markets	7,025	7,140	+2	11,215	11,610	10	10

EXHIBIT C-1b

Turnkey Systems— Data Base Reconciliation of Market Forecast by Industry-Specific and Cross-Industry Markets

Delivery Mode	1988 Market			1993 Market		1988-1993 CAGR Fcst. in 1988 Rpt. (%)	1989-1994 CAGR Fcst. in 1989 Rpt. (%)
	1988 Fcst. ($ M)	1989 Rpt. ($ M)	Variance as Percent of 1989 Rpt.	1988 Fcst. ($ M)	1989 Rpt. ($ M)		
Cross-Industry Sector:							
Planning and Analysis	290	270	(7)	340	320	3	3
Accounting	400	400	-	475	465	4	3
Education and Training	150	150	-	185	190	4	4
Engineering and Scientific	330	330	-	540	590	10	12
Office Systems	850	850	-	1,660	1,460	14	11
Human Resources	110	110	-	140	145	5	5
*Other Cross-Industry	370	370	-	600	550	10	8
Total Cross-Industry Markets	2,500	2,480	-	3,935	3,715	10	8
Total Turnkey Systems IS Industry	9,525	9,620	+1	15,150	15,325	10	10

*Includes cross-industry distribution, sales and marketing, and electronic publishing.



Appendix: INPUT Information Services Industry 1989 Questionnaire

INPUT

INFORMATION SERVICES INDUSTRY 1989 QUESTIONNAIRE

OFFICE USE ONLY
☐☐☐☐☐
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GENERAL INFORMATION

Please confirm the correct spelling of your company's mailing address and write down any changes below your mailing label. Or attach your business card.

Place Mailing Label Here

Company Name: _____

Address-1: _____

Address-2: _____

City: _____ State: _____

Zip: _____ Telephone: _____

Your Name: _____ CEO's Name: _____

Your Title: _____ CEO's Title: _____

1. Is your company PUBLICLY or PRIVATELY held? Public ☐ Private ☐
2. When did the company's LAST fiscal year end? Month End ☐☐ (M M) Year End ☐☐ (Y Y)

REVENUE INFORMATION

3. What were the company's total WORLDWIDE revenues for fiscal year 1988?
   Worldwide Revenues $ ☐☐,☐☐☐,☐☐☐,☐☐☐

4. Please indicate what percent of your company's 1988 worldwide NONCAPTIVE[1] INFORMATION SERVICES[2] revenues come from the following geographic regions:

A. United States	☐☐☐	%
B. Canada	☐☐☐	%
C. Mexico	☐☐☐	%
D. Africa	☐☐☐	%
E. Asia Excluding Japan	☐☐☐	%
F. Australia or New Zealand	☐☐☐	%
G. Europe	☐☐☐	%
H. Japan Only	☐☐☐	%
I. South America	☐☐☐	%
J. Other	☐☐☐	%

(Specify)_____

(The total of . thru J. must equal 100%)

5. What were the company's NONCAPTIVE U.S. INFORMATION SERVICES revenues for fiscal years 1988 and 1987?

Fiscal 1988

U.S. Information Services Revenues $ ☐☐,☐☐☐,☐☐☐,☐☐☐

Fiscal 1987

U.S. Information Services Revenues $ ☐☐,☐☐☐,☐☐☐,☐☐☐

Continued on other side ☞

[1]Revenues derived from sales to users that are not part of the same parent corporation. For example, revenues from Boeing Computer Services to another Boeing division are excluded.

[2]Computer-related services involving one or more of the following: processing services, network services, software products, turnkey systems, systems integration, professional services.

6. What percent of the company's U.S information services revenue growth for fiscal years 1988 and 1987 resulted from ACQUISITIONS/DIVESTITURES, PRICE INCREASES, and/or SALES GROWTH?

	Fiscal 1988	Fiscal 1987
A. Acquisitions/Divestitures	☐☐☐ %	☐☐☐ %
B. Price Increases	☐☐☐ %	☐☐☐ %
C. Sales Growth	☐☐☐ %	☐☐☐ %

(The total of A. thru C. must equal 100%)

REVENUE SOURCES

7. Please indicate what percent of the company's 1988 U.S. information services revenue was derived from the following services and products:

A. Processing Services[3] ..... ☐☐☐ %
B Network Services[4] ..... ☐☐☐ %
C. Applications Software[5] ... ☐☐☐ %
D. Systems Software[6] ..... ☐☐☐ %
E. Turnkey Systems[7] ..... ☐☐☐ %
F. Systems Integration[8] ..... ☐☐☐ %
G. Professional Services[9] ..... ☐☐☐ %

(The total of A. thru G. must equal 100%)

EMPLOYEE INFORMATION

8. How many persons were employed by your company in the U.S. as of 12/31/88?

Total U.S. Employees ☐☐☐,☐☐☐

9. What percent of the company's total U.S. employees were involved with INFORMATION SERVICES activities as of 12/31/88?

Percent U.S. Information Services employees ☐☐☐ %

SUBSIDIARY/DIVISION OPERATIONS

10. Is your company a subsidiary or division of another company?

NO ☐ IF NO, Please skip to Question 12. YES ☐ IF YES, Please continue to Question 11.

11. Please provide the following information of your PARENT company.

Name of Parent
Company:_____

City:_____ State:_____

12. Please list all divisions or subsidiaries, if any, owned by your company or by your parent company, that are engaged in INFORMATION SERVICES activities. Attach additional sheets of paper if necessary.

Name of Company:_____
Is the company a: Subsidiary ☐ Division ☐
City:_____ State:_____
Name of Company:_____
Is the company a: Subsidiary ☐ Division ☐
City:_____ State:_____
Name of Company:_____
Is the company a: Subsidiary ☐ Division ☐
City:_____ State:_____

THANK YOU FOR YOUR COOPERATION!

---

[3]Processing of computer-based applications using vendor computers for transaction processing, utility processing, other processing services, and systems operations.

[4]Network-oriented services or functions such as value-added networks, electronic mail, electronic data interchange, on-line data bases, news data bases.

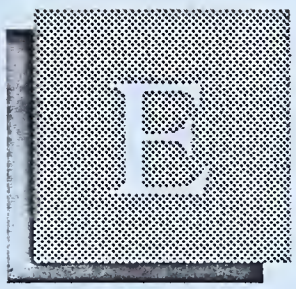
[5]Software that performs functions that are directly related to solving users' business or organization needs. Examples are payroll, inventory control, and financial planning.

[6]Software that enables the computer or communication system to perform basic machine functions such as systems control, data center management, and application development.

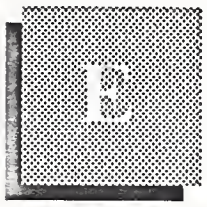
[7]Integration of systems software, packaged and customized applications software with CPU, equipment, and peripherals. System is packaged and delivered as a single applications solution.

[8]Delivery of multidisciplinary, multivendor systems, incorporating some or all of these functions: systems design, programming, integration, equipment, networks, installation and acceptance.

[9]Management consulting activity related to electronic data processing consulting, production of custom software, education and training, and systems operations of client-owned computers.



Appendix: Value-Added Resellers Questionnaire



Appendix: Valued-Added Resellers Questionnaire

Questionnaire 11/6/89

Value-Added Resellers

Introduction:

INPUT is contacting a number of value-added resellers in several vertical and cross-industry markets as part of its annual survey on trends and issues impacting the value-added reseller/turnkey systems markets. The results of the study are confidential. The report will be published in January, 1990. An Executive Overview of the report will be provided each survey participant.

INPUT defines a value-added reseller as a company that takes ownership of hardware and/or software products and adds value to the final sale. Many provide a total solution, which is a turnkey systems sale.

Others in the industry (not considered VARs) are systems integrators (although some VARs are also systems integrators) and application software developers.

Questions:

1) Would you describe your product offering by:

a) Target market/markets

---

b) Hardware platform/platforms

---

c) Systems software

---

d) Value-added part of the solution

---

2) Do you provide a turnkey systems solution?

3) Have there been any recent major changes in your product by targeted market, platform, product configuration, etc.?

4) What were the major determining factors in your choice of computer hardware and/or systems software vendors?

5) What do you consider to be the most important product support characteristics of your equipment vendors?

6) What are some additional product support programs you would like to see from your vendors?

7) Have you experienced any distribution channel conflict with your vendors?

a) If yes, please explain the nature of the conflict:

b) What have your vendors done to try to reduce distribution channel conflict?

8) What type of hardware and software support/maintenance is provided with your product?

a) What percentage of the support is provided by you?

b) Other sources of product support/maintenance?

9) How do you market your product?

a) Direct sales _____ (percentage of total sales)

b) Indirect sales (please explain nature, i.e., agents, and percentage of total sales)

10) What is your primary geographic market(s)?

a) Do you have any plans to expand geographic market coverage in the near term? What are the factors behind such deliberations?

11) Could you provide some specifics on the direction of your product expansion, in response to your customer needs and/or changes in the competitive environment?

a) Will you be expanding professional services offerings (such as consulting, education and training, and product implementation)?

b) Will you be providing hardware add-ons (such as additional peripherals)?

c) Are you planning to add LAN implementation? Client/server product support—SAA?

d) Will you be providing support for additional hardware platforms and/or systems software?

e) Will you be providing additional interfaces to other software products (for example, licensing software from other VARs and/or software developers for expanding your product by cross-industry support)? Or providing a new generation of products integrated around an RDBMS (relational data basemanagement systems software product)?

f) Will you be placing more emphasis on providing a customizable product strategy?

1. Will you be developing with a 4GL to provide a more flexible, customizable product?

g) Will you be developing cross-product exchanges with other VARs?

h) Will you be enhancing proprietary software product offerings as a continuing principal product development direction?

i) Will you be providing more support for evolving industry standards?

_____

_____

12) What do you see as the principal issues/trends currently impacting the success of value-added resellers ?

_____

_____

_____

13) What do you perceive as key product/service factors in a successful VAR strategy?

_____

_____

_____

Now I'd like to ask you some questions about your company:

14) What is the size of your company?

a) Number of employees _____

b) Revenues

1._____ Under $1 million
2._____ $1 million to $ 5 million
3._____ $5 million to $10 million
4._____ $10 to $20 million
5._____ $20 million+

15) What is the recent historical growth rate in revenues? _____

a) Expected 1989-90 annual growth rate? _____

16) What is the profitability of your company, as measured by pretax margin?

a)____ Over 20%
b)____ 10% to 20%
c)____ Under 10%
d)____ Not profitable

17) Who is your principal competition?

_____

a) Were there any changes in the nature of the competition in the recent past, such as from computer systems vendors, RBOCs, and other new market entrants?

_____

_____

To thank you for participating, we will be sending you a copy of the Executive Overview of INPUT's Turnkey Systems report when it is published, by the end of January 1990.

Report Quality Evaluation

To our clients:
To ensure that the highest standards of report quality are maintained, INPUT would appreciate your assessment of this report. Please take a moment to provide your evaluation of the usefulness and quality of this study. When complete, simply fold, staple, and drop in the mail. Postage has been pre-paid by INPUT if mailed in the U.S.

Thank You.

1. Report title: ***U.S. Turnkey Systems Markets, 1989-1994*** (MAN3)

2. Please indicate your reason for reading this report:
   - ☐ Required reading
   - ☐ Area of high interest
   - ☐ Area of general interest
   - ☐ New product development
   - ☐ Business/market planning
   - ☐ Product planning
   - ☐ Future purchase decision
   - ☐ Systems planning
   - ☐ Other _____

3. Please indicate extent report used and overall usefulness:

	Extent		Usefulness (1=Low, 5=High)				
	Read	Skimmed	1	2	3	4	5
Executive Overview	☐	☐	☐	☐	☐	☐	☐
Complete report	☐	☐	☐	☐	☐	☐	☐
Part of report (___ _ %)	☐	☐	☐	☐	☐	☐	☐

4. How useful were:

Data presented	☐	☐	☐	☐	☐
Analyses	☐	☐	☐	☐	☐
Recommendations	☐	☐	☐	☐	☐

5. How useful was the report in these areas:

Alert you to new opportunities or approaches	☐	☐	☐	☐	☐
Cover new areas not covered elsewhere	☐	☐	☐	☐	☐
Confirm existing ideas	☐	☐	☐	☐	☐
Meet expectations	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐

6. Which topics in the report were the most useful? Why?_____

_____

7. In what ways could the report have been improved? _____

_____

8. Other comments or suggestions: _____

_____

_____
Name Title

_____
Department

_____
Company

_____
Address

_____
City State ZIP

_____ _____
Telephone Date completed

Thank you for your time and cooperation.

M&S 633/01 12/89

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